KAISER PERMANENTE®
COLORADO LABORATORY

Urine Drug Screen Qualitative Panel (BIO-RAD TOX/See™ Drug Screen Test)

PRINCIPLE:

The Bio-Rad TOX/See Drug Screen Test is a rapid, one step screening test for the simultaneous, qualitative detection of multiple drugs and drug metabolites in human urine. This test is intended for medical and other professional in vitro diagnostic use only.

The TOX/See Drug Screen Test is a rapid urine screening test that can be performed without the use of an instrument. The test is a lateral flow chromatographic immunoassay for the qualitative detection of multiple drugs and drug metabolites in urine at the following cut-off concentrations in urine:

Test	Calibrator	Cut-off (ng/mL)
Amphetamine (AMP)	d-Amphetamine	1,000
Barbiturates (BAR)	Secobarbital	300
Benzodiazepines (BZO)	Oxazepam	300
Cocaine (COC)	Benzoylecgonine	300
Marijuana (THC)	11-nor-Δ^9-THC-9 COOH	50
Methadone (MTD)	Methadone	300
Opiate (OPI 300)	Morphine	300

The TOX/See Drug Screen Test yields a positive result for a drug when the measured concentration of the drug, or a specific drug metabolite, is greater than the cutoff value listed in the table. This test will detect other related compounds, (please refer to the Analytical Specificity table in the Bio-Rad TOX/See Drug Screen Test package insert). This assay provides only a preliminary qualitative test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

SCOPE:

All Medical Technologists and Medical Laboratory Technicians at the Lakewood Medical Office Laboratory

Written by: R Del Rosario, 6-2013

SPECIMEN REQUIREMENTS:

1. The required specimen type is urine. The urine specimen must be collected in a clean and dry container. Urine collected at any time of the day may be used.
2. Instruct patient to perform a “dirty collection”. Do not use cleansing wipes and use the first part of the urine sample.
3. Urine specimens may be stored at 2-8°C for up to 48 hours prior to testing. Allow specimen to come to room temperature prior to testing.
4. For prolonged storage, specimens may be frozen and stored below -20°C for up to 30 days. Frozen specimens should be thawed and mixed well before testing. Once thawed, allow specimen to come to room temperature prior to testing.
5. Specimens other than Urine is not suitable for this method (ie., Whole blood, serum, plasma, body fluid, etc).
6. A minimum of 2.0 ml is required for testing and for possible confirmatory test.

EQUIPMENT AND MATERIALS

Equipment:

None

Materials:

1. Plastic pour off test tube with cap
2. Plastic transfer pipette
3. Specimen rack
4. TOX/See multi-Drugscreen Panel 8-test (THC/COC/AMP/PCP/BAR/BZO/OPI/MTD). 25 sealed kits / pack. Catalog number: 194-5209
    - Each sealed kit contains: 1 Test device and 1 Dropper
    - Store as packaged in the sealed pouch either at room temperature or refrigerated (2-30°C). DO NOT FREEZE.
    - The test device is stable through the expiration date printed on the sealed pouch.
    - The test device must remain in the sealed pouch until use.
5. Liquichek™ Qualitative Urine Toxicology Positive Control. Catalog number: 455 (6 x 3 ml)
6. Liquichek™ Qualitative Urine Toxicology Negative Control. Catalog number: 454 (6 x 3 ml)

CALIBRATION

None

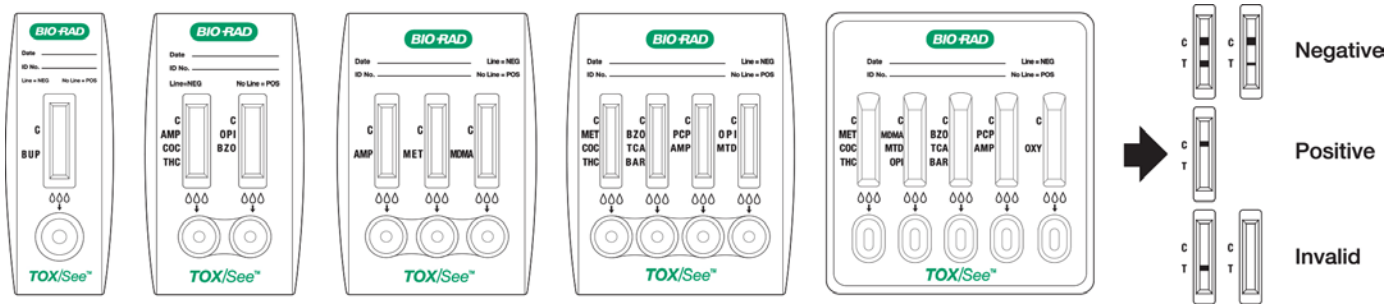
QUALITY CONTROL

1. A procedural control is included in the test. A colored line appearing in the control line region (C) is considered an internal procedural control. It confirms sufficient specimen volume, adequate membrane wicking and correct procedural technique – See Urine Drug Screen Internal QC and Accession number log.
2. To ensure proper kit performance external positive and negative quality control material is performed with each new lot or shipment of product and every 30 days. When testing the external positive and negative controls, use the same test procedures as with a urine specimen. Use the monthly QC log to document results
3. Perform positive and negative external QC on each new lot or shipment. In addition, run external positive and negative QC side by side with the new lot. Document result on the new shipment / lot QC worksheet.

4. Liquichek™ Qualitative Urine Toxicology positive and negative external controls are used.
    a. These are stable until the printed expiration date when stored unopened at 2-8^{0}C
    b. Once opened, they are kept at room temperature for up to 30 days. Write the open and the new 30 day expiration date with your initials when opening a new bottle.

PROCEDURE:

1. Allow the test device, urine specimen, and/or controls to equilibrate to room temperature (15-30°C) prior to testing.
2. Bring the pouch to room temperature before opening it. Remove the test device from the sealed pouch and use it as soon as possible.
3. Place the test device on a clean and level surface.
4. Place an LIS aliquot label on the test kit.
5. Hold the dropper vertically and transfer 3 full drops of urine (approx. 100 µL total volume) to each specimen well of the test device, and then start the timer. Avoid trapping air bubbles in the specimen well. See the illustration below



6. Wait for the colored lines(s) to appear.
7. Read results at 5 minutes. Do not interpret after one hour
8. Attach a small LIS aliquot label (or write the accession #) on the Drug Screen Urine Qualitative worksheet and write YES or NO if internal QC was acceptable. There is no need to write patient results on the worksheet. These are entered directly into the LIS.
9. Pour an aliquot of the urine sample, place the long barcode label on it, write the date on the cap and freeze for 30 days. Discard samples from freezer after 30 days.

RESULT INTERPRETATION:

1. Refer to the illustration above.
2. **NEGATIVE**:* A colored line in the control line region (C) and a colored line in the test line region (T) for a specific drug indicate a negative result. This indicates that the drug concentration in the urine specimen is below the designated cut-off level for that specific drug.
    ***NOTE**: The shade of color in the test line region (T) may vary, but it should be considered negative whenever there is even a faint colored line.
3. **POSITIVE**: A colored line in the control line region (C) but no line in the test line region (T) for a specific drug indicates a positive result. This indicates that the drug concentration in the urine specimen exceeds the designated cut-off for that specific drug
4. **INVALID**: Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and

repeat the test using a new test device. If the problem persists, discontinue using the lot immediately and contact Bio-Rad.

CALCULATIONS:

None

REPORTING RESULTS

1. Results are verified in the LIS under the “ARE” application using the COLK MAN OTHER service resource. “LTL” the accession number from “CORR 800”.

2. Negative results are reported as “0”. The LIS will convert the result to “Negative”.

3. Positive results are reported as “5000”. The LIS will convert the result to “Positive”

4. A result interpretation with the following verbiage is appended: “Toxicology screens performed at Kaiser Permanente Lakewood Laboratory are screening procedures only - chain of custody is not maintained. We recommend confirmation of positive tests if clinically indicated.”

REFERENCE RANGE

None Detected

SUMMARY OF DRUGS INCLUDED IN THE PANEL

AMPHETAMINE (AMP)

Amphetamine is a Schedule II controlled substance available by prescription (Dexedrine®) and is also available on the illicit market. Amphetamines are a class of potent sympathomimetic agents with therapeutic applications. They are chemically related to the human body’s natural catecholamines: epinephrine and norepinephrine. Acute higher doses lead to enhanced stimulation of the central nervous system and induce euphoria, alertness, reduced appetite, and a sense of increased energy and power. Cardiovascular responses to Amphetamines include increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations, and psychotic behavior. The effects of Amphetamines generally last 2-4 hours following use and the drug has a half-life of 4-24 hours in the body. About 30% of Amphetamines are excreted in the urine in unchanged form, with the remainder as hydroxylated and deaminated derivatives.

The TOX/See Drug Screen Test is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Amphetamines in urine. The TOX/See Drug Screen Test yields a positive result when Amphetamines in urine exceed 1,000 ng/mL. This is the suggested screening cut-off for positive specimens set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).[1]

BARBITURATES (BAR)

Barbiturates are central nervous system depressants. They are used therapeutically as sedatives, hypnotics, and anticonvulsants. Barbiturates are almost always taken orally as capsules or tablets. The effects resemble those of intoxication with alcohol. Chronic use of barbiturates leads to tolerance and physical dependence.

Short acting Barbiturates taken at 400 mg/day for 2-3 months can produce a clinically significant degree of physical dependence. Withdrawal symptoms experienced during periods of drug abstinence can be severe enough to cause death.

Only a small amount (less than 5%) of most Barbiturates are excreted unaltered in the urine.[2] The approximate detection time limits for Barbiturates are:

Short acting (e.g. Secobarbital) 100 mg PO (oral) 4.5 days

Long acting (e.g. Phenobarbital) 400 mg PO (oral) 7 days

The TOX/See Drug Screen Test is a rapid urine-screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Barbiturates in urine. The TOX/See Drug Screen Test yields a positive result when the Barbiturates in urine exceed 300 ng/mL.

BENZODIAZEPINES (BZO)

Benzodiazepines are medications that are frequently prescribed for the symptomatic treatment of anxiety and sleep disorders. They produce their effects via specific receptors involving a neurochemical called gamma aminobutyric acid (GABA). Because they are safer and more effective, Benzodiazepines have replaced barbiturates in the treatment of both anxiety and insomnia. Benzodiazepines are also used as sedatives before some surgical and medical procedures, and for the treatment of seizure disorders and alcohol withdrawal.

Risk of physical dependence increases if Benzodiazepines are taken regularly (e.g., daily) for more than a few months especially at higher than normal doses. Stopping abruptly can bring on such symptoms as trouble sleeping, gastrointestinal upset, feeling unwell, loss of appetite, sweating, trembling, weakness, anxiety and changes in perception.

Only trace amounts (less than 1%) of most Benzodiazepines are excreted unaltered in the urine; most of the concentration in urine is conjugated drug. The detection period for the Benzodiazepines in the urine is 3-7 days.

The TOX/See Drug Screen Test is a rapid urine-screening test that can be performed without the use of an instrument. The test utilizes the antibody to selectively detect elevated levels of Benzodiazepines in urine. The TOX/See Drug Screen Test yields a positive result when the Benzodiazepines in urine exceed 300 ng/mL.

COCAINE (COC)

Cocaine is a potent central nervous system (CNS) stimulant and a local anesthetic. Initially, it brings about extreme energy and restlessness while gradually resulting in tremors, over-sensitivity and spasms. In large amounts, cocaine causes fever, unresponsiveness, difficulty in breathing and unconsciousness.

Cocaine is often self-administered by nasal inhalation, intravenous injection and free-base smoking. It is excreted in the urine in a short time primarily as Benzoylecgonine.[2,3] Benzoylecgonine, a major metabolite of cocaine, has a longer biological half-life (5-8 hours) than cocaine (0.5-1.5 hours), and can generally be detected for 24-48 hours after cocaine exposure.[3]

The TOX/See Drug Screen Test is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Cocaine metabolite in urine. The TOX/See Drug Screen Test yields a positive result when the cocaine metabolite in urine exceeds 300 ng/mL. This is the suggested screening cut-off for positive specimens set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).[1]

MARIJUANA (THC)

THC (Δ^9-tetrahydrocannabinol) is the primary active ingredient in cannabis (marijuana). When smoked or orally administered, THC produces euphoric effects. Users have impaired short-term memory and slowed learning. They may also experience transient episodes of confusion and anxiety. Long-term, relatively heavy use may be associated with behavioral disorders. The peak effect of marijuana administered by smoking occurs in 20-30 minutes and the duration is 90-120 minutes after one cigarette. Elevated levels of urinary metabolites are found within hours of exposure and remain detectable for 3-10 days after smoking. The main metabolite excreted in the urine is 11-nor-Δ^9-tetrahydrocannabinol-9-carboxylic acid (Δ^9-THC-COOH).

The TOX/See Drug Screen Test is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Marijuana in urine. The TOX/See Drug Screen Test yields a positive result when the concentration of THC-COOH in urine exceeds 50 ng/mL. This is the suggested screening cut-off for positive specimens set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).[1]

METHADONE (MTD)

Methadone is a narcotic analgesic prescribed for the management of moderate to severe pain and for the treatment of opiate dependence (heroin, Vicodin, Percocet, Morphine). The pharmacology of Oral Methadone is very different from

IV Methadone. Oral Methadone is partially stored in the liver for later use. IV Methadone acts more like heroin. In most states you must go to a pain clinic or a Methadone maintenance clinic to be prescribed Methadone.

Methadone is a long acting pain reliever producing effects that last from 12 to 48 hours. Ideally, Methadone frees the client from the pressures of obtaining illegal heroin, from the dangers of injection, and from the emotional roller coaster that most opiates produce.

Methadone, if taken for long periods and at large doses, can lead to a very long withdrawal period. The withdrawals from Methadone are more prolonged and troublesome than those provoked by heroin cessation, yet the substitution and phased removal of methadone is an acceptable method of detoxification for patients and therapists.[4]

The TOX/See Drug Screen Test is a rapid urine-screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Methadone in urine. The TOX/See Drug Screen Test yields a positive result when the Methadone in urine exceeds 300 ng/mL.

OPIATE (OPI 300)

Opiate refers to any drug that is derived from the opium poppy, including the natural products, morphine and codeine, and the semi-synthetic drugs such as heroin. Opioid is more general, referring to any drug that acts on the opioid receptor.

Opioid analgesics comprise a large group of substances which control pain by depressing the central nervous system. Large doses of morphine can produce higher tolerance levels, physiological dependency in users, and may lead to substance abuse. Morphine is excreted unmetabolized, and is also the major metabolic product of codeine and heroin. Morphine is detectable in the urine for several days after an opiate dose.[1]

The TOX/See Drug Screen Test is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Morphine in urine. The TOX/See Drug Screen Test yields a positive result when the concentration of opiate exceeds the 300 ng/mL cut-off level.

PHENCYCLIDINE (PCP)

Phencyclidine, also known as PCP or Angel Dust, is a hallucinogen that was first marketed as a surgical anesthetic in the 1950's. It was removed from the market because patients receiving it became delirious and experienced hallucinations.

Phencyclidine is used in powder, capsule, and tablet form. The powder is either snorted or smoked after mixing it with marijuana or vegetable matter. Phencyclidine is most commonly administered by inhalation but can be used intravenously, intra-nasally, and orally. After low doses, the user thinks and acts swiftly and experiences mood swings from euphoria to depression. Self-injurious behavior is one of the devastating effects of Phencyclidine.[2]

PCP can be found in urine within 4 to 6 hours after use and will remain in urine for 7 to 14 days, depending on factors such as metabolic rate, user's age, weight, activity, and diet.[1] Phencyclidine is excreted in the urine as an unchanged drug (4% to 19%) and conjugated metabolites (25% to 30%).[2]

The TOX/See Drug Screen Test yields a positive result when the phencyclidine level in urine exceeds 25 ng/mL. This is the suggested screening cut-off for positive specimens set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).[1]

MAINTENANCE:

None

LIMITATIONS AND INTERFERING SUBSTANCES

1. The TOX/See Drug Screen Test provides only a qualitative, preliminary analytical result. A secondary analytical method must be used to obtain a confirmed result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method.
2. There is a possibility that technical or procedural errors, as well as other interfering substances in the urine specimen may cause erroneous results.
3. Adulterants, such as bleach and/or alum, in urine specimens may produce erroneous results regardless of the analytical method used. If adulteration is suspected, the test should be repeated with another urine specimen.
4. A positive result does not indicate level or intoxication, administration route or concentration in urine.

5. A negative result may not necessarily indicate drug-free urine. Negative results can be obtained when drug is present but below the cut-off level of the test.
6. The test does not distinguish between drugs of abuse and certain medications.
7. A positive result might be obtained from certain foods or food supplements.

REFERENCES

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2. Robert DeCresce. Drug Testing in the workplace, 1989.
3. Ambre J. J. Anal. Toxicol. 1985; 9:241
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5. Winger, Gail, A Handbook of Drug and Alcohol Abuse, Third Edition, Oxford Press, 2004, page 95.
6. Baselt, RC. Disposition of Toxic Drugs and Chemicals in Man, 4th edition, Chemical Toxicology Institute, 1999.

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COLORADO LABORATORY PROCEDURE REVIEW

LABORATORY SITE: Lakewood DEPARTMENT: Medical Office Lab

PROCEDURE: Urine Drug Screen Qualitative Panel (Lakewood Only)

WRITTEN BY/DATE: R. Delrosario

Revised by/Date:

Director Review

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Dr. Cheryl Teuton	*Dr. Cheryl Teuton*	**N/A**