

T-Cube®

One Step  
Multi-Drug Oral Fluid Test Cube

For in vitro diagnostic use.

**T-Cube®** One Step Multi-Drug Oral Fluid Test Cube offers qualitative detection of the following drugs of abuse and their principal metabolites in human oral fluid at specified cut-off levels for use in employment and insurance testing: Amphetamine (AMP), Barbiturates (BAR), Benzodiazepines (BZO), Buprenorphine (BUP), Cocaine (COC), Marijuana (THC), Methadone (MTD), Methamphetamine (MET), Methylenedioxymethamphetamine (MDMA), Opiate (OPI), and Oxycodone (OXY).

INTENDED USE

**T-Cube®** One Step Multi-Drug Oral Fluid Test Cube is a rapid oral fluid screening test. The test is a lateral flow, one-step immunoassay for the qualitative detection of specific drugs and their metabolites in human oral fluid at the following cut off concentrations for use in employment and insurance testing.

Test	Calibrator	Cut off (ng/mL)
Amphetamine (AMP)	D-Amphetamine	50
Barbiturates (BAR)	Secobarbital	60
Benzodiazepines (BZO)	Oxazepam	30
Buprenorphine (BUP)	Buprenorphine	5
Cocaine (COC)	cocaine	20
Marijuana (THC)	11-nor-Δ <sup>9</sup> -THC-9-COOH	25
Methadone (MTD)	Methadone	30
Methamphetamine (MET)	D-Methamphetamine	50
Methylenedioxymethamphetamine (MDMA)	3,4- Methylenedioxymethamphetamine HCl(MDMA)	100
Opiate (OPI)	Morphine	40
Oxycodone (OXY)	Oxycodone	20

This test will detect other related compounds, please refer to the Analytical Specificity table in this package insert.

**Amphetamine (AMP):** Amphetamine is a sympathomimetic amine with therapeutic indications. The drug is often self-administered by nasal inhalation or oral ingestion.

**Barbiturates (BAR):** Barbiturates are a class of central nervous system depressants. Abuse of barbiturates can lead not only to impaired motor coordination and mental disorder, but also to respiratory collapse, coma and even death. Barbiturates are taken orally, rectally, or by intravenous and intramuscular injections.

**Benzodiazepines (BZO):** Benzodiazepines are medications that are frequently prescribed for the symptomatic treatment of anxiety and sleep disorders.

**Buprenorphine (BUP):** Buprenorphine is a potent analgesic often used in the treatment of opioid addiction. The drug is sold under the trade names Subutex™, Buprenex™, Temgesic™ and Suboxone™, which contain Buprenorphine HCl alone or in combination with Naloxone HCl. Therapeutically, Buprenorphine is used as a substitution treatment for opioid addicts. Substitution treatment is a form of medical care offered to opiate addicts (primarily heroin addicts) based on a similar or identical substance to the drug normally used. In substitution therapy, Buprenorphine is as effective as Methadone but demonstrates a lower

level of physical dependence.

**Cocaine (COC):** Cocaine derived from leaves of coca plant, is a potent central nervous system stimulant and a local anesthetic. Among the psychological effects induced by using cocaine are euphoria, confidence and a sense of increased energy, accompanied by increased heart rate, dilation of the pupils, fever, tremors and sweating.

**Tetrahydrocannabinol (THC):** Tetrahydrocannabinol, the active ingredient in the marijuana plant (cannabis sativa), is detectable in oral fluid shortly after use. The detection of the drug is thought to be primarily due to the direct exposure of the drug to the mouth (oral and smoking administrations) and the subsequent sequestering of the drug in the buccal cavity.

**Methadone (MTD):** Methadone is a synthetic analgesic drug that is originally used in the treatment of narcotic addict. The drug is often administered orally or intravenously and is metabolized in the liver and excreted in urine.

**Methamphetamine (MET):** Methamphetamine is a potent stimulant chemically related to amphetamine but with greater CNS stimulation properties. The drug is often self-administered by nasal inhalation, smoking or oral ingestion.

**Methylenedioxymethamphetamine (MDMA):** Methylenedioxymethamphetamine (ecstasy) is a designer drug first synthesized in 1914 by a German drug company for the treatment of obesity. Those who take the drug frequently report adverse effects, such as increased muscle tension and sweating. MDMA is not clearly a stimulant, although it has, in common with amphetamine drugs, a capacity to increase blood pressure and heart rate. MDMA does produce some perceptual changes in the form of increased sensitivity to light, difficulty in focusing, and blurred vision in some users.

**Opiates (OPI):** The opiates such as heroin, morphine, and codeine are derived from the resin of opium poppy. The principal metabolites of opiates are morphine, morphine-3-glucuronide, normorphine and codeine with a half-life of about 3 hours. Heroin is quickly metabolized to morphine. Thus, morphine and morphine glucuronide might both be found in the saliva of a person who has taken only heroin. The body also changes codeine to morphine. Thus, the presence of morphine (or the metabolite, morphine glucuronide) in the saliva indicates heroin, morphine and/or codeine use. The window of detection varies for different opiates. Codeine can be detected within one hour and up to 7-21 hours after a single oral dose. Morphine is detectable for several days after a dose.

**Oxycodone (OXY):** Oxycodone is known as Oxycontin, Roxicodone and is an ingredient of Percodan, Percocet, Roxicet and Tylox. Oxycodone is a semi-synthetic opiate derived from opium. Like other opiates, oxycodone is characterized by its analgesic properties, and the tendency for users to form a physical dependency and develop tolerance with extended use. Oxycodone is usually administered in combination with non-opiate analgesics such as acetaminophen and salicylates for the relief of moderate to severe pain. Oxycodone is a central nervous system depressant that may cause drowsiness, dizziness, lethargy, weakness and confusion. Toxicity in an overdose of oxycodone can lead to stupor, coma, muscle flaccidity, severe respiratory depression, hypotension, and cardiac arrest.

The assay provides a qualitative, preliminary test result. A more specific analytical method must be used in order to obtain a confirmed result. Gas Chromatography/Mass Spectrometry (GC/MS) or Liquid Chromatography/Tandem Mass Spectrometry (LC/MS-MS) are preferred confirmatory methods. Professional judgment should be applied to any drug test result, particularly when preliminary results are positive.

PRINCIPLE

Drug test:

**T-Cube®** One Step Multi-Drug Oral Fluid Test Cube is a competitive immunoassay that is used to screen for the presence of drugs in oral fluid. It is a chromatographic absorbent device in which drugs or drug metabolites in a sample competitively combine to a limited number of antibody-dye conjugate binding sites.

When the sponge end of the collector is immersed into the oral fluid sample, the sample is absorbed into the device by capillary action, mixes with the antibody-dye conjugate, and flows across the pre-coated membrane. When sample drug levels are zero or below the target cutoff (the detection sensitivity of the test), antibody-dye conjugate binds to the drug/protein conjugate immobilized in the Test Region (T) of the device. This produces a colored test line that, regardless of its intensity, indicates a negative result. When sample drug levels are at or above the target cutoff, the free drug in the sample binds to the antibody-dye conjugate preventing the antibody-dye conjugate from binding to the drug-protein conjugate immobilized in the Test Region (T) of the device. This prevents the development of a distinct colored band in the test region, indicating a potentially positive result.

To serve as a procedure control, a colored line will appear at the Control Region (C), if the test has been performed properly.

PRECAUTIONS

1. Not to be used for clinical diagnosis.
2. Do not swallow.
3. Discard after first use. The test cannot be used more than once.
4. Do not use the test kit beyond expiration date.
5. Do not use the test if the pouch is punctured or not sealed.
6. Keep out of the reach of children.
7. Do not read results after 5 minutes.
8. The used collector and cube should be discarded according to local regulations.

MATERIAL

Materials Provided

- Test Cube
- Sponge Collector
- Package Insert

Material Required but Not Provided

- Timer

STORAGE AND STABILITY

1. Store at 4°C - 30°C (40°F - 86°F) in the sealed pouch up to the expiration date
2. Keep away from direct sunlight, moisture and heat.
3. DO NOT FREEZE.
4. Preferably open the pouch only shortly before collection and testing.

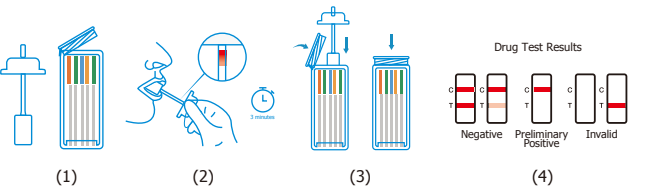
SPECIMEN COLLECTION AND PREPARATION

Collect the oral fluid sample using the sponge collector provided. Instruct the donor to not place anything in the mouth including food, drink, gum, or tobacco products for at least 10 minutes prior to collection. No other collection devices should be used with this assay. Oral fluid collected at any time of the day may be used.

TEST PROCEDURE

Allow the kit and specimen to come to room temperature (65°F-86°F/18°C-30°C) prior to testing. AVOID PLACING ANYTHING IN THE MOUTH 10 MINUTES PRIOR TO TESTING.

1. Remove the test cube and the sponge collector from the foil pouch by tearing at the notch. Place the test cube upright on a level surface.
2. Put the sponge end of the collector on your tongue or near cheek to collect oral fluid for about 3 minutes until color on saturation indicator strip appears RED in the indicator window. If color on saturation indicator has not turned red at 7 minutes, repeat the collection using a new device, beginning with Step 1.
3. Open the test cube and place the saturated oral fluid collector inside the test cube. Press the sponge collector down firmly until it reaches the bottom of the test cube then tightly close the cube lid. Keep test cube upright on flat surface and follow Step 4.
4. Interpreting Drug Test Results:  
Read results in 5 minutes. Do not read after 5 minutes.



INTERPRETATION OF RESULTS

Drug test results:

**Negative (-)**

A colored band is visible in the Control Region (C) and the appropriate Test Region (T). It indicates that the concentration of the corresponding drug of that specific test zone is zero or below the detection limit of the test.

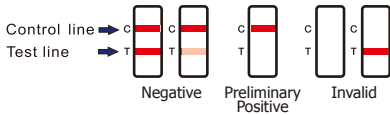
**Preliminary Positive (+)**

A colored band is visible in the Control Region (C). No color band appears in the appropriate test region. It indicates a positive result for the corresponding drug of that specific Test Region (T).

**Invalid**

If a colored band is not visible in the Control Region (C) the test is invalid. Another test should be run to re-evaluate the specimen. If test still fails, please contact the distributor with the lot number.

**Note:** There is no meaning attributed to line color intensity or width.



#### QUALITY CONTROL

Though there is an internal procedural control line in the test device of Control region, the use of external controls is strongly recommended as good laboratory testing practice to confirm the test procedure and to verify proper test performance. Positive and negative control should give the expected results. When testing the positive and negative control, the same assay procedure should be adopted.

#### LIMITATIONS OF PROCEDURE

- The test provides only a qualitative, preliminary result. A secondary analytical method must be used to obtain a confirmed result. Gas Chromatography/Mass Spectrometry (GC/MS) or Liquid Chromatography/Tandem Mass Spectrometry (LC/MS-MS) are preferred confirmatory methods.
- A positive test result does not indicate the concentration of drug in the specimen or the route of administration.
- A negative result may not necessarily indicate a drug-free specimen. Drug may be present in the specimen below the cutoff level of the assay.

#### PERFORMANCE CHARACTERISTICS

##### A. Analytical Sensitivity

Standard drugs were spiked into negative PBS pool to the concentration of -50% cut-off, -25% cut-off, cut-off, +25% cut-off and +50% cut-off. The results were summarized below.

Drug Conc. (Cut-off range)	n	AMP		BZO		MTD		THC		MET		BAR		COC	
		-	+	-	+	-	+	-	+	-	+	-	+	-	+
0% Cut-off	30	30	0	30	0	30	0	30	0	30	0	30	0	30	0
-50% Cut-off	30	30	0	30	0	30	0	30	0	30	0	30	0	30	0
-25% Cut-off	30	28	2	26	4	25	5	14	16	28	2	25	5	25	5
Cut-off	30	12	18	10	20	12	18	14	16	10	20	10	20	10	20
+25% Cut-off	30	8	22	5	25	6	24	5	25	8	22	6	24	6	24
+50% Cut-off	30	0	30	0	30	0	30	0	30	0	30	0	30	0	30

Drug Conc. (Cut-off range)	n	OPI		MDMA		BUP		OXY	
		-	+	-	+	-	+	-	+
0% Cut-off	30	30	0	30	0	30	0	30	0
-50% Cut-off	30	30	0	30	0	30	0	30	0
-25% Cut-off	30	14	16	25	5	26	4	14	16
Cut-off	30	10	20	10	20	14	16	14	16
+25% Cut-off	30	5	25	6	24	5	25	5	25
+50% Cut-off	30	0	30	0	30	0	30	0	30

##### B. Analytical Specificity

The following table lists the concentration of compounds (ng/mL) above which the **T-Cube®** One Step Multi-Drug Oral Fluid Test Cube identified positive results at a read time of 5 minutes.

Amphetamine (AMP)		Methadone (MTD)	
D-Amphetamine	50	Methadone	30
D,L-Amphetamine	125	Doxylamine	5,000
β-Phenylethylamine	4000		
Tryptamine	1,500	Methamphetamine (MET)	
p-Hydroxyamphetamine	800	D-Methamphetamine	50
(+)-3,4-Methylenedioxymethamphetamine (MDA)	150	Fenfluramine	60,000
		p-Hydroxymethamphetamine	400
Barbiturates (BAR)		Methoxyphenamine	25,000
Secobarbital	60	3,4-Methylenedioxymethamphetamine (MDMA)	50
Amobarbital	30	L-Phenylephrine	4,000
Alphenol	15	Procaine	2,000
Aprobarbital	20	(1R,2S) - (-) Ephedrine	400
Butobarbital	10		
Butathal	10	Methylenedioxymethamphetamine (MDMA)	
Butalbital	250	3,4-Methylenedioxymethamphetamine HCl (MDMA)	100
Cyclopentobarbital	60	3,4-Methylenedioxymethamphetamine HCl	300
Pentobarbital	30	3,4-Methylenedioxymethamphetamine	60
Phenobarbital	10		
		Opiate (OPI)	
Benzodiazepines (BZO)		Morphine	40
Oxazepam	30	Codeine	10
Alprazolam	30	Ethylmorphine	24
α-Hydroxyalprazolam	300	Hydromorphone	100
Bromazepam	300	Hydrocodone	100
Chlordiazepoxide	300	Levorphanol	400
Clonazepam HCl	30	Morphine 3-β-D-Glucuronide	50
Clobazam	45	Norcodeine	1,500
Clonazepam	30	Normorphine	12,500
Clorazepate dipotassium	90	Nalorphine	10,000
Delorazepam	300	Oxycodone	25,000
Desalkylflurazepam	150	Oxymorphone	25,000
Diazepam	30	Thebaine	1,500
Estazolam	600	Diacetylmorphine (Heroin)	50
Flunitrazepam	150	Ethylmorphine	24
D,L-Lorazepam	210		
Midazolam	12,600	Oxycodone (OXY)	
		Oxycodone	20
Buprenorphine (BUP)		Dihydrocodeine	4,000
Buprenorphine	5	Codeine	10,000
Buprenorphine-3-D-Glucuronide	7.5	Hydromorphone	10,000
Norbuprenorphine	10	Morphine	>10,000
Norbuprenorphine-3-D-Glucuronide	100	Acetylmorphine	>10,000
		Buprenorphine	>10,000
		Ethylmorphine	>10,000
Cocaine (COC)			
Cocaine	20		
Benzoyllecgonine	100		
Cocaine HCl	20		
Cocaethylene	25		
Ecgonine HCl	1,500		
Ecgonine methylester	12,500		

Marijuana (THC)			
11-nor-Δ <sup>9</sup> -THC-9-COOH	25		
11-nor-Δ <sup>8</sup> -THC-9-COOH	60		
11-hydroxy-Δ <sup>9</sup> -THC	2,500		
Δ <sup>8</sup> -THC	7,500		
Δ <sup>9</sup> -THC	10,000		
Cannabinol	10,000		
Cannabidiol	100,000		

##### C. Cross-Reactivity

A study was conducted to determine the cross-reactivity of the test with compounds spiked into drug-free PBS stock. The following components show no cross-reactivity when tested with **T-Cube®** One Step Multi-Drug Oral Fluid Test Cube at a concentration up to 100 µg/mL.

Acetaminophen	Loperamide
Acetophenetidin	Maprotiline
N-Acetylprocainamide	Meprobamate
Acetylsalicylic Acid	Methadone
Aminopyrine	Methoxyphenamine
Amobarbital	(+) 3,4-Methylenedioxymethamphetamine
Amoxicillin	Labeltalol
Ampicillin	Meperidine
Ascorbic Acid	Meprobamate
Apomorphine	Methylphenidate
Aspartame	Nalidixic Acid
Atropine	Naloxone
Benzilic Acid	Naltrexone
Benzoic Acid	Naproxen
Benzphetamine	Niacinamide
D,L -Brompheniramine	Nifedipine
Caffeine	Norethindrone
Cannabidiol	D-Norpropoxyphene
Chloralhydrate	Noscapine
Chloramphenicol	D,L-Octopamine
Chlorothiazide	Oxalic Acid
(±) Chlorpheniramine	Oxolinic Acid
Chlorpromazine	Oxymetazoline
Chloroquine	Papaverine
Cholesterol	Penicillin-G
Clonidine	Pentazocine
Cortisone	Perphenazine
(-) Cotinine	Phenelzine
Creatinine	D, L -Propranolol
Deoxycorticosterone	D-Propoxyphene
Dextromethorphan	D-Pseudoephedrine
Diclofenac	Quinidine
Diffunisal	Quinine
Digoxin	Ranitidine
Diphenhydramine	Salicylic acid
(-)ψ-Ephedrine	Serotonin (5- Hydroxytyramine)
β-Estradiol	Sulfamethazine
Ethyl-p-aminobenzoate	Sulindac
Fenoprofen	Tetracycline
Furosemide	Tetrahydrocortisone, 3 Acetate
Gentisic Acid	Thiamine
Hemoglobin	Thioridazine
Hydralazine	D, L-Tyrosine
Hydrochlorothiazide	Tolbutamide
Hydrocortisone	Triamterene
O-Hydroxyhippuric Acid	Trifluoperazine
p-Hydroxytyramine	Trimethoprim

Ibuprofen	D, L-Tryptophan
Iproniadiz	Tyramine
Isoproterenol	Uric Acid
Isoxsuprine	Verapamil
Ketamine	Zomepirac
Ketoprofen	

#### BIBLIOGRAPHY OF SUGGESTED READING

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- Schramm, W. et al, "Drugs of Abuse in Saliva: A Review," J Anal Tox, 1992 Jan-Feb; 16 (1), pp 1-9.
- McCarron, MM, et al, "Detection of Phencyclidine Usage by Radioimmunoassay of Saliva," J Anal Tox. 1984 Sep-Oct.; 8 (5), pp 197-201.

#### INDEX OF SYMBOLS

	Keep away from sunlight
	Store between 4°C - 30°C (40°F - 86°F)
	Keep dry
	Do not re-use
	In vitro diagnostic use

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