CEDIA™ Phencyclidine (PCP) Assay

thermo scientific

IVD **For In Vitro Diagnostic Use**

Rx Only

REF 100172 (3 x 17 mL Kit)
100173 (65 mL Kit)
1815784 (495 mL Kit)

Intended Use
The CEDIA™ PCP assay is an in vitro diagnostic medical device intended for the qualitative and semiquantitative determination of phencyclidine (PCP) in human urine.

The assay provides only a preliminary analytical test result. A more specific alternative chemical method must be used to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method.[1] Clinical consideration and professional judgement should be applied to any drug of abuse test result particularly when preliminary positive results are used.

Summary and Explanation of the Test
Phencyclidine (PCP) is the most commonly abused mind-altering drugs.[2-5] Once marketed as an intravenous anesthetic for humans, the drug was classified as illegal in the US in 1967.[3] PCP can cause lethargy, sedation, disorientation, and agitation; in higher doses, hallucinations, psychoses, seizures, and coma.[2,4,5]

PCP is lipophilic and stored by the body in brain and adipose tissue for considerable periods.[4,6] The half-life of PCP has been estimated at 7 to 50 hours.[2,3,6,7] Metabolism occurs mainly in the liver.[6,7] PCP is excreted primarily as unchanged drug and inactive conjugates.[2,3] Complete excretion of the drug usually occurs within 72 hours of administration;[3] however, urine samples may remain positive for as long as 2 weeks after administration.[7] Renal clearance of PCP is increased markedly with urinary acidification.[2,6,7]

The CEDIA PCP assay uses recombinant DNA technology (US Patent No. 4708929) to produce a unique homogeneous enzyme immunoassay system.[8] The assay is based on the bacterial enzyme β-galactosidase, which has been genetically engineered into two inactive fragments. These fragments spontaneously reassociate to form fully active enzyme that, in the assay format, cleaves a substrate, generating a color change that can be measured spectrophotometrically.

In the assay, drug in the sample competes with drug conjugated to one inactive fragment of β-galactosidase for antibody binding site. If drug is present in the sample, it binds to antibody, leaving the inactive enzyme fragments free to form active enzyme. If drug is not present in the sample, antibody binds to drug conjugated on the inactive fragment, inhibiting the reassociation of inactive β-galactosidase fragments, and no active enzyme is formed. The amount of active enzyme formed and resultant absorbance change are directly proportional to the amount of drug present in the sample.

Reagents
- **1 EA Reconstitution Buffer:** Contains piperazine-N, N-bis [2-ethanesulfonic acid], buffer salts, 0.44 mg/L mouse monoclonal anti-PCP antibody, stabilizer and preservative.
- **1a EA Reagent:** Contains 0.171 g/L enzyme acceptor, buffer salt, detergent and preservative.
- **2 ED Reconstitution Buffer:** Contains piperazine-N, N-bis [2-ethanesulfonic acid], buffer salt and preservative.
- **2a ED Reagent:** Contains 12.6 µg/L enzyme donor-PCP conjugate, 1.67 g/L chlorophenol red-β-D-galactopyranoside, stabilizer and preservative.

Additional Materials: Bar Code Labels (for Cat. Nos. 100172 and 100173 only. Refer to analyzer specific application sheet for directions on usage.) Empty analyzer bottles for EA/ED solution pour-over (Cat. No. 100173). Empty analyzer bottle for ED working solution pour-over (Cat. No. 1815784 only.)

Additional Materials Required (sold separately):
CEDIA Negative Calibrator
CEDIA Multi-Drug Calibrator, Primary Cutoffs
CEDIA Multi-Drug Calibrator, Secondary Cutoffs
CEDIA Multi-Drug Intermediate Calibrator
CEDIA Multi-Drug High Calibrator
CEDIA Multi-Drug Control Set

⚠ Precautions and Warnings
DANGER: Powder reagent contains ≤56% w/w bovine serum albumin (BSA), and ≤2% w/w sodium azide. Liquid reagent contains ≤1.0% bovine serum, ≤0.3% sodium azide and ≤0.1% Drug-specific antibody (Mouse).
H317 - May cause allergic skin reaction.
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
EUH032 - Contact with acids liberates very toxic gas.

Avoid breathing dust/mist/vapors/spray. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/eye protection/face protection. In case of inadequate ventilation wear respiratory protection. If on skin: Wash with plenty of soap and water. IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If skin irritation or rash occurs: Get medical advice/attention. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician. Wash contaminated clothing before reuse. Dispose of contents/container to location in accordance with local/regional/national/international regulations.

Reagent Preparation and Storage
For preparation of the solutions for Hitachi analyzers, refer below. For all other analyzers, refer to the analyzer specific application sheet. Prepare the following solutions using cold reagents and buffers. Remove the kit from refrigerated storage immediately prior to preparation of the solutions.

Prepare the solutions in the following order to minimize possible contamination.

R2 Enzyme donor solution: Connect Bottle 2a (ED Reagent) to Bottle 2 (ED Reconstitution Buffer) using one of the enclosed adapters. Mix by gentle inversion, ensuring that all the lyophilized material from Bottle 2a is transferred into Bottle 2. Avoid the formation of foam. Detach Bottle 2a and adapter from Bottle 2 and discard. Cap Bottle 2 and let stand approximately 5 minutes at 15-25°C. Mix again. Record the reconstitution date on the bottle label.
R1 Enzyme acceptor solution: Connect Bottle 1a (EA Reagent) to Bottle 1 (EA Reconstitution Buffer) using one of the enclosed adapters. Mix by gentle inversion, ensuring that all the lyophilized material from Bottle 1a is transferred into Bottle 1. Avoid the formation of foam. Detach Bottle 1a and adapter from Bottle 1 and discard. Cap Bottle 1 and let stand approximately 5 minutes at 15-25°C. Mix again. Record the reconstitution date on the bottle label.

Catalog No. 100173 - Hitachi 717, 911, 912 or 914 analyzer: Transfer the reconstituted reagents into the corresponding empty R1 and R2 100 mL bottles supplied with the kit. **Hitachi 917/Modular analytics P system:** Use the reconstituted reagents without transfer of bottles. Discard the empty 100 mL bottles.
Catalog No. 1815784 - Hitachi 747 analyzer/Modular analytics D system: Use the funnel provided to transfer a portion of the R2 Solution into the appropriately labeled empty R2 Solution bottle provided.

NOTE 1: The components supplied in this kit are intended for use as an integral unit. Do not mix components from different lots.
NOTE 2: Avoid cross-contamination of reagents by matching reagent caps to the proper reagent bottle. The R2 Solution should be yellow-orange in color. A dark red or purple-red color indicates that the reagent has been contaminated and must be discarded.
NOTE 3: The R1 and R2 Solutions must be at the reagent compartment temperature of the analyzer before performing the assay. Refer to the analyzer specific application sheet for additional information.
NOTE 4: To ensure reconstituted EA reagent stability, protect from prolonged continuous exposure to bright light.

Store reagents at 2-8°C. **DO NOT FREEZE.** For stability of the unopened components, refer to the box or bottle labels for the expiration date.

R1 Solution: 60 days refrigerated on analyzer or at 2-8°C.
R2 Solution: 60 days refrigerated on analyzer or at 2-8°C.

Specimen Collection and Handling
Collect urine samples in clean glass or plastic containers. Centrifuge highly turbid specimens before testing. Adulteration of a urine sample can affect test results; if adulteration is suspected, obtain another sample for testing. Handle and dispose of all human urine samples as if potentially infectious.

The Mandatory Guidelines for Federal Workplace Drug Testing Programs; Final Guidelines; Notice recommends that specimens that do not receive an initial test within 7 days of arrival at the laboratory should be placed into secure refrigeration units.[9]

Assay Procedure
Chemistry analyzers capable of maintaining a constant temperature, pipetting samples, mixing reagents, measuring enzymatic rates and timing the reaction accurately can be used to perform this assay. Application sheets with specific instrument parameters are available from Microgenics, a part of Thermo Fisher Scientific.

Additional barcode labels are provided for semi-quantitative determination with the 17 mL and 65 mL kits only. To use, over label each bottle with the correct label.

Quality Control and Calibration[10]
For quality control, use the Multi-Drug Control Set. The control intervals and limits must be adapted to the individual laboratory and country-specific requirements. Values obtained should fall within established limits.

Qualitative analysis
The selected cutoff calibrator, containing 25 ng/mL phencyclidine, is used as a reference in distinguishing between positive and negative samples. See the analyzer specific application sheet.

Semiquantitative analysis
Use the Multi-Drug Calibrator (either Primary or Secondary) along with Negative, Intermediate and High Calibrator to analyze results. See the analyzer specific application sheet.

Good laboratory practice suggests that controls be run each day patient samples are tested and each time calibration is performed. It is recommended that two levels of controls be run; one 25% above the cutoff; the other 25% below the cutoff. Recalibrate the test if reagents are changed or if control results are outside of established limits. Each laboratory should establish corrective measures to be taken if values fall outside the limits. Base assessment of quality control on the values obtained for the controls, which should fall within specified limits. If any trends or sudden shifts in values are detected, review all operating parameters. Contact Customer Technical Support for further assistance. All quality control requirements should be performed in conformance with local, state and/or federal regulations or accreditation requirements.

Results and Expected Values

Qualitative results
The Multi-Drug Primary or Secondary Cutoff Calibrator (both contain 25 ng/mL PCP) is used as a reference in distinguishing between positive and negative samples. Samples producing a response value equal or greater than the response value of the cutoff calibrator are considered positive. Samples producing a response value less than the response value of the cutoff calibrator are considered negative. Refer to the analyzer specific application sheet for additional information.

Semiquantitative results
The Multi-Drug Primary or Secondary Cutoff Calibrator, used in conjunction with Negative, Intermediate and High Calibrators, can be used to estimate relative concentration of PCP. Refer to the analyzer specific application sheet for detailed information.

Care should be taken when reporting concentration results since there are many other factors that may influence a urine test result such as fluid intake and other biological factors.

Limitations

1. A positive test result indicates the presence of phencyclidine only; it does not indicate or measure intoxication.
2. Other substances and/or factors not listed may interfere with the test and cause false results (eg, technical or procedural errors).

Specific Performance Characteristics

The data determined using a Hitachi system are given below.[11] Results obtained in individual laboratories may differ.

Precision
Precision study was determined using the calibrator and controls in a modified NCCLS replication experiment (6 replicates once a day for 21 days).

Qualitative (mAU/min):

	Within-run			Total-run		
Sample	Mean	SD	%CV	Mean	SD	%CV
-25% Control	281.1	2.0	0.7	281.1	4.2	1.5
Cutoff Calibrator	323.1	2.3	0.7	323.1	4.8	1.5
+25% Control	370.4	2.1	0.6	370.4	5.1	1.4

Accuracy
Two hundred and forty-nine clinical samples and 20 spiked samples (phencyclidine spiked to within ±25% of the 25 ng/mL cutoff into negative urine) were assayed with the modified CEDIA PCP assay on the Hitachi 717 analyzer using the current CEDIA PCP as reference. Results were as follows:

		Modified CEDIA PCP	
		+	-
Current CEDIA PCP	+	126	4*
	-	0	139

* The samples were tested by GC/MS and the following results were obtained.

Specificity
The following parent compounds and metabolites when tested with the CEDIA PCP assay yielded the following percent cross-reactivity results:

Compound	**Concentration Tested (ng/mL)**	**% Cross-Reactivity**
Phencyclidine (PCP)	25	100
4-Phenyl-4-piperidinocyclohexanol (4-OH-PCP)	5000	0.4

Structurally unrelated compounds were tested with the CEDIA PCP assay and gave a negative response when tested at the concentrations listed below.

Compound	**(ng/mL)**	**Compound**	**(ng/mL)**
Acetaminophen	500,000	Fluoxetine	500,000
Acetylsalicylic acid	500,000	Ibuprofen	500,000
Amoxicillin	100,000	Levothyroxine	500,000
Amphetamine	100,000	Methadone	100,000
Benzoylecgonine	100,000	Methamphetamine	100,000
Captopril	500,000	Morphine	100,000
Chlordiazepoxide	100,000	Nifedipine	500,000
Cimetidine	500,000	Phenobarbital	100,000
Codeine	100,000	Propoxyphene	100,000
Dextromethorphan	500,000	Ranitidine	500,000
Diazepam	100,000	Salicyluric acid	100,000
Digoxin	100,000	Secobarbital	100,000
Diphenhydramine	500,000	11-nor-Δ^9-THC-COOH	9,330
Enalapril	500,000	Verapamil	500,000

Sensitivity
For the Qualitative application, the limit of detection (LOD) was 1.05 ng/mL.

References

1. Hawks RL. Analytical methodology. In: Hawks RL, Chiang CN, eds. Urine Testing for Drugs of Abuse. NIDA Research Monograph. 1986; 73:30-41.
2. Baselt RC, Cravey RH. Disposition of Toxic Drugs and Chemicals In Man. 4th ed. Foster City, Calif: Chemical Toxicology Institute; 1995.
3. Giannini AJ. Phencyclidine. In: Giannini AJ, Slaby AE, eds. Drugs of Abuse. Oradell, NJ: Medical Economics Books; 1989.
4. Aniline O, Pitts FN Jr. Phencyclidine (PCP): A review and perspectives. CRC Critical Reviews in Toxicology. 1982; 10:145-177.
5. Marwah J, Pitts DK. Psychopharmacology of phencyclidine. In: Clouet DH, ed. Phencyclidine: An Update. NIDA Research Monograph. 1986; 64:127-133.
6. Busto U, Bendayan R, Sellers EM. Clinical pharmocokinetics of non-opiate abused drugs. Clin Pharmacokinetics. 1989; 16:1-26.
7. Jerrard DA. Designer drugs - A current perspective. J Emer Med. 1990;8:733-741.
8. Henderson DR, Friedman SB, Harris JD, et al. CEDIA, a new homogeneous immunoassay system. Clin Chem. 1986; 32:1637-1641.
9. Notice of mandatory guidelines for federal workplace drug testing program: Final Guidelines. Federal Register. 1994; 110 (June 9):11983. (Revised Guidelines expected in 2002).
10. Data on traceability are on file at Microgenics Corporation, a part of Thermo Fisher Scientific.
11. Data on file at Microgenics Corporation, a part of Thermo Fisher Scientific.

Glossary:
http://www.thermofisher.com/symbols-glossary

Microgenics Corporation
46500 Kato Road
Fremont, CA 94538 USA
US Customer and
Technical Support:
1-800-232-3342

EC REP
B·R·A·H·M·S GmbH
Neuendorfstrasse 25
16761 Hennigsdorf, Germany

For insert updates go to:
www.thermofisher.com/diagnostics

Other countries:
Please contact your local Thermo Fisher Scientific representative.

10007400-7-EN
2019 06

thermo scientific