THC2

cobas®

ONLINE DAT Cannabinoids II

Order information

REF	CONTENT		Analyzer(s) on which **cobas c** pack(s) can be used
04491009 190	ONLINE DAT Cannabinoids II (200 tests)	System-ID 07 6921 5	**cobas c** 311, **cobas c** 501/502
03304671 190	Preciset DAT Plus I calibrators CAL 1-6 (6 x 5 mL)	Codes 431-436	
03304680 190	Preciset DAT Plus II calibrators CAL 1-6 (6 x 5 mL)	Codes 437-442	
03304698 190	C.f.a.s. DAT Qualitative Plus (6 x 5 mL)		
04590856 190	C.f.a.s. DAT Qualitative Plus Clinical (3 x 5 mL)	Code 699	
03312950 190	Control Set DAT I (for 50 ng/mL assay) PreciPos DAT Set I (2 x 10 mL) PreciNeg DAT Set I (2 x 10 mL)		
04500873 190	Control Set DAT Clinical (for 50 ng/mL assay) PreciPos DAT Clinical (2 x 10 mL) PreciNeg DAT Clinical (2 x 10 mL)		
03312968 190	Control Set DAT II (for 20 ng/mL assay) PreciPos DAT Set II (2 x 10 mL) PreciNeg DAT Set II (2 x 10 mL)		
03312976 190	Control Set DAT III (for 100 ng/mL assay) PreciPos DAT Set III (2 x 10 mL) PreciNeg DAT Set III (2 x 10 mL)		

English

System information

For **cobas c** 311/501 analyzers:

TH2Q2: ACN 441 (Urine): for qualitative assay, 20 ng/mL

TH5Q2: ACN 442 (Urine): for qualitative assay, 50 ng/mL

TH1Q2: ACN 443 (Urine): for qualitative assay, 100 ng/mL

TH2S2: ACN 444 (Urine): for semiquantitative assay, 20 ng/mL

TH5S2: ACN 445 (Urine): for semiquantitative assay, 50 ng/mL

TH1S2: ACN 446 (Urine): for semiquantitative assay, 100 ng/mL

TH5QC: ACN 797 (Urine): for qualitative assay, 50 ng/mL; using C.f.a.s. DAT Qualitative Plus Clinical

For **cobas c** 502 analyzer:

TH2Q2: ACN 8441 (Urine): for qualitative assay, 20 ng/mL

TH5Q2: ACN 8442 (Urine): for qualitative assay, 50 ng/mL

TH1Q2: ACN 8443 (Urine): for qualitative assay, 100 ng/mL

TH2S2: ACN 8444 (Urine): for semiquantitative assay, 20 ng/mL

TH5S2: ACN 8445 (Urine): for semiquantitative assay, 50 ng/mL

TH1S2: ACN 8446 (Urine): for semiquantitative assay, 100 ng/mL

TH5QC: ACN 8797 (Urine): for qualitative assay, 50 ng/mL; using C.f.a.s. DAT Qualitative Plus Clinical

Intended use

Cannabinoids II (THC2) is an in vitro diagnostic test for the qualitative and semiquantitative detection of cannabinoids in human urine on Roche/Hitachi **cobas c** systems at cutoff concentrations of 20 ng/mL, 50 ng/mL and 100 ng/mL. Semiquantitative test results may be obtained that permit laboratories to assess assay performance as part of a quality control program. Semiquantitative assays are intended to determine an appropriate dilution of the specimen for confirmation by a confirmatory method such as gas chromatography/mass spectrometry (GC-MS).

Cannabinoids II provides only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. GC-MS is the preferred confirmatory method.[1] Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

Summary

The principal psychoactive component of the hemp plant, *Cannabis sativa,* is generally accepted to be Δ^9 tetrahydrocannabinol (Δ^9 THC), although other cannabinoids may contribute to the psychological and physiological actions of marijuana. The acute effects of marijuana use, concomitant with the desired "high", are memory impairment, time confusion, interference with learning, impaired motor skills and depersonalization.[2,3,4] These effects are also manifested in chronic users in addition to cardiovascular, pulmonary, and reproductive effects. Marijuana is usually smoked, but may be ingested, either incorporated into food or as a liquid extract (tea). It is rapidly absorbed from the lungs into the blood with rapid onset of effects; the onset is slower but prolonged when ingested. The natural cannabinoids and their metabolic products are fat soluble and are stored in the body's fatty tissues, including brain tissue, for prolonged periods after use.[5]

Cannabinoid metabolites are found in blood, bile, feces, and urine and may be detected in urine within hours of exposure. Because of their fat solubility, they also remain in the body's fatty tissues with slow release and subsequent urinary excretion for days, weeks, and even months after the last exposure, depending on the intensity and frequency of use.[1] The prominent Δ^9 THC metabolite, 11-nor-Δ^9 THC-9-carboxylic acid (Δ^9 COOH-THC), is the primary urinary marker for detecting marijuana use.

Test principle

The assay is based on the kinetic interaction of microparticles in a solution (KIMS)[6,7] as measured by changes in light transmission. In the absence of sample drug, soluble drug conjugates bind to antibody-bound microparticles, causing the formation of particle aggregates. As the aggregation reaction proceeds in the absence of sample drug, the absorbance increases.

When a urine sample contains the drug in question, this drug competes with the drug derivative conjugate for microparticle-bound antibody. Antibody bound to sample drug is no longer available to promote particle aggregation, and subsequent particle lattice formation is inhibited. The presence of sample drug diminishes the increasing absorbance in proportion to the concentration of drug in the sample. Sample drug content is determined relative to the value obtained for a known cutoff concentration of drug.[8]

Reagents - working solutions

R1 Conjugated cannabinoid derivative; buffer; bovine serum albumin; 0.09 % sodium azide

R2 Microparticles attached to cannabinoid antibody (mouse monoclonal); buffer; bovine serum albumin; 0.09 % sodium azide

R1 is in position B and R2 is in position C.

Precautions and warnings

For in vitro diagnostic use.
Exercise the normal precautions required for handling all laboratory reagents.
Disposal of all waste material should be in accordance with local guidelines.
Safety data sheet available for professional user on request.

For USA: Caution: Federal law restricts this device to sale by or on the order of a physician.

THC2

ONLINE DAT Cannabinoids II

cobas®

Reagent handling

Ready for use

Carefully invert reagent container several times prior to use to ensure that the reagent components are mixed.

Storage and stability

Shelf life at 2-8 °C:	See expiration date on **cobas c** pack label
On-board in use and refrigerated on the analyzer:	8 weeks

Do not freeze.

Specimen collection and preparation

Only the specimens listed below were tested and found acceptable.

Urine: Collect urine samples in clean glass or plastic containers. Fresh urine specimens do not require any special handling or pretreatment, but an effort should be made to keep pipetted samples free of gross debris. Samples should be within the normal physiological pH range of 5-8. No additives or preservatives are required. It is recommended that urine specimens be stored at 2-8 °C and tested within 5 days of collection.[9]

For prolonged storage, freezing of the sample is recommended.

Centrifuge highly turbid specimens before testing.

See the limitations and interferences section for details about possible sample interferences.

Sample stability claims were established by experimental data by the manufacturer or based on reference literature and only for the temperatures/time frames as stated in the method sheet. It is the responsibility of the individual laboratory to use all available references and/or its own studies to determine specific stability criteria for its laboratory.

It has been reported that THC and its derivatives may adsorb onto plastics used for sample collection containers, effectively lowering the drug concentration of the sample.[10]

Adulteration or dilution of the sample can cause erroneous results. If adulteration is suspected, another sample should be collected. Specimen validity testing is required for specimens collected under the *Mandatory Guidelines for Federal Workplace Drug Testing Programs*.[11]

CAUTION: Specimen dilutions should only be used to interpret results of Calc.? and Samp.? alarms, or when estimating concentration in preparation for GC-MS. Dilution results are not intended for patient values. Dilution procedures, when used, should be validated.

Materials provided

See "Reagents – working solutions" section for reagents.

Materials required (but not provided)

See "Order information" section

General laboratory equipment

Assay

THC and its derivatives may adsorb onto plastics.[10] To minimize the potential for lowering the drug concentration of any sample containing THC, the following is recommended:

1. Dispense > 0.5 mL of each sample (calibrators, controls and patient specimens) into separate analyzer sample cups by pouring over from the primary container or by dispensing with a glass pipette.
2. Avoid the use of plastic pipettes and/or tips due to the potential for adsorbance and possible decrease of THC concentration.
3. Assay the samples within 2 hours of dispensing into the sample cup.
4. Do not return any unused material back into the original sample container.

For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator's manual for analyzer-specific assay instructions.

The performance of applications not validated by Roche is not warranted and must be defined by the user.

Application for urine

Deselect Automatic Rerun for these applications in the Utility menu, Application screen, Range tab.

cobas c 311 **test definition - 20 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 8-22	10 / 8-22
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)
R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	4.5 µL	–	–
Decreased	4.5 µL	–	–
Increased	4.5 µL	–	–

cobas c 501/ 502 **test definition - 20 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 13-31	10 / 13-31
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)
R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	4.5 µL	–	–
Decreased	4.5 µL	–	–
Increased	4.5 µL	–	–

cobas c 311 **test definition - 50 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 8-22	10 / 8-22
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)

R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	2.5 µL	–	–
Decreased	2.5 µL	–	–
Increased	2.5 µL	–	–

cobas c 501/502 **test definition - 50 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 13-31	10 / 13-31
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)
R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	2.5 µL	–	–
Decreased	2.5 µL	–	–
Increased	2.5 µL	–	–

cobas c 311 **test definition - 100 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 8-22	10 / 8-22
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)
R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	2.0 µL	–	–
Decreased	2.0 µL	–	–
Increased	2.0 µL	–	–

cobas c 501/ 502 **test definition - 100 ng/mL cutoff assay**

	Semiquantitative	Qualitative
Assay type	2-Point End	2-Point End
Reaction time / Assay points	10 / 13-31	10 / 13-31
Wavelength (sub/main)	– /570 nm	– /570 nm
Reaction direction	Increase	Increase
Unit	ng/mL	mAbs
Reagent pipetting		Diluent (H_2O)
R1	90 µL	–
R2	40 µL	–

Sample volumes	*Sample*	*Sample dilution*	
		Sample	*Diluent (NaCl)*
Normal	2.0 µL	–	–
Decreased	2.0 µL	–	–
Increased	2.0 µL	–	–

Calibration

Calibrators	*Semiquantitative applications* *20 ng/mL cutoff assay* S1-5: Preciset DAT Plus II calibrators, CAL 1-5 0, 10, 20, 40, 100 ng/mL *50 ng/mL cutoff assay* S1-5: Preciset DAT Plus I calibrators, CAL 1-4, 6 0, 20, 50, 100, 300 ng/mL *100 ng/mL cutoff assay* S1-5: Preciset DAT Plus I calibrators, CAL 1, 3-6 0, 50, 100, 200, 300 ng/mL *Qualitative applications* *20 ng/mL cutoff assay* S1: Preciset DAT Plus II calibrator - CAL 3 20 ng/mL *50 ng/mL cutoff assay* S1: C.f.a.s. DAT Qualitative Plus, C.f.a.s. DAT Qualitative Plus Clinical, or Preciset DAT Plus I calibrator - CAL 3 50 ng/mL *100 ng/mL cutoff assay* S1: Preciset DAT Plus I calibrator - CAL 4 100 ng/mL The drug concentrations of the calibrators have been verified by GC-MS.
Calibration K Factor	For the qualitative applications, enter the K Factor as -1000 into the Calibration menu, Status screen, Calibration Result window.
Calibration mode	*Semiquantitative applications* Result Calculation Mode (RCM)[a] *Qualitative applications* Linear
Calibration frequency	Full (semiquantitative) or blank (qualitative) calibration • after reagent lot change • as required following quality control procedures

a) See Result section.

Calibration interval may be extended based on acceptable verification of calibration by the laboratory.

Traceability: This method has been standardized against a primary reference method (GC-MS).

Quality control

For quality control, use control materials as listed in the "Order information" section.

In addition, other suitable control material can be used.

Drug concentrations of Control Set DAT I, II, III and Clinical have been verified by GC-MS.

The control intervals and limits should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits.

Follow the applicable government regulations and local guidelines for quality control.

Results

For the qualitative assay, the cutoff calibrator is used as a reference in distinguishing between preliminary positive and negative samples. Samples producing a positive or "0" absorbance value are considered preliminary positive. Preliminary positive samples are flagged with >Test. Samples producing a negative absorbance value are considered negative. Negative samples are preceded by a minus sign.

The semiquantitation of preliminary positive results should only be used by laboratories to determine an appropriate dilution of the specimen for confirmation by a confirmatory method such as GC-MS. It also permits the laboratory to establish quality control procedures and assess control performance.

For the semiquantitative assay, the analyzer computer constructs a calibration curve from absorbance measurements of the standards using a 4 parameter logit-log fitting function (RCM). The logit-log function fits a smooth line through the data points. The analyzer computer uses absorbance measurements of samples to calculate drug or drug metabolite concentration by interpolation of the logit-log fitting function.

NOTE: If a result of Calc.? or Samp.? alarm is obtained, review the Reaction Monitor data for the sample and compare with the Reaction Monitor data for the highest calibrator. The most likely cause is a high concentration of the analyte in the sample, in which case the absorbance value for the sample will be less than that of the highest calibrator. Make an appropriate dilution of the sample using the 0 ng/mL calibrator and rerun the sample. A normal drug-free urine may be substituted for the 0 ng/mL calibrator if the urine and procedure have been validated by the laboratory. To ensure that the sample was not over-diluted, the diluted result, prior to multiplying by the dilution factor, must be at least half the analyte cutoff value. If the diluted result falls below half the analyte cutoff value, repeat the sample with a smaller dilution. A dilution that produces a result closest to the analyte cutoff is the most accurate estimation. To estimate the preliminary positive sample's concentration, multiply the result by the appropriate dilution factor. Dilutions should only be used to interpret results of Calc.? or Samp.? alarms, or when estimating concentration in preparation for GC-MS.

Use caution when reporting results as there are various factors that influence a urine test result, such as fluid intake and other biological factors.

As with any sensitive test for drugs of abuse on automated clinical chemistry analyzers, the possibility exists for analyte carry-over from a sample with an extremely high concentration to a normal (negative) sample which immediately follows it.

Preliminary positive results should be confirmed by another method.

Limitations - interference

See the "Specific performance data" section of this document for information on substances tested with this assay. There is the possibility that other substances and/or factors may interfere with the test and cause erroneous results (e.g., technical or procedural errors).

A preliminary positive result with this assay indicates the presence of cannabinoids and/or cannabinoid metabolites in urine. It does not measure the level of intoxication.

With a low cutoff assay for cannabinoids, it may be possible to obtain a preliminary positive test result from a non-user as a result of passive inhalation. Significant increases in urinary levels of cannabinoids from passive inhalation have been reported to occur only after exposure to extremely high concentrations of marijuana smoke in small unventilated areas.[12] These extreme exposure conditions are not typical of the usual situations in which the drug is used. More recent reports indicate that urine cannabinoid concentrations resulting from passive inhalation are not likely to exceed 20 ng/mL.[12,13,14]

Interfering substances were added to drug free urine at the concentration listed below. These samples were then spiked to 20 ng/mL using a THC stock solution. Samples were tested on a Roche/Hitachi 917 analyzer and the following results were obtained.

Substance	Concentration Tested	% THC Recovery
Acetone	1 %	98
Ascorbic acid	1.5 %	80
Bilirubin	0.25 mg/mL	111
Creatinine	5 mg/mL	99
Ethanol	1 %	105
Glucose	2 %	101
Hemoglobin	7.5 g/L	95
Human albumin	0.5 %	105
Oxalic acid	2 mg/mL	92
Sodium chloride	0.5 M	100
Sodium chloride	1 M	106
Urea	6 %	100

Interfering substances were added to drug free urine at the concentration listed below. These samples were then spiked to 50 ng/mL using a THC stock solution. Samples were tested on a Roche/Hitachi 917 analyzer and the following results were obtained.

Substance	Concentration Tested	% THC Recovery
Acetone	1 %	110
Ascorbic acid	1.5 %	105
Bilirubin	0.25 mg/mL	114
Creatinine	5 mg/mL	113
Ethanol	1 %	108
Glucose	2 %	108
Hemoglobin	7.5 g/L	108
Human albumin	0.5 %	107
Oxalic acid	2 mg/mL	113
Sodium chloride	0.5 M	108
Sodium chloride	1 M	110
Urea	6 %	115

Interfering substances were added to drug free urine at the concentration listed below. These samples were then spiked to 100 ng/mL using a THC stock solution. Samples were tested on a Roche/Hitachi 917 analyzer and the following results were obtained.

Substance	Concentration Tested	% THC Recovery
Acetone	1 %	112
Ascorbic acid	1.5 %	88
Bilirubin	0.25 mg/mL	110
Creatinine	5 mg/mL	101
Ethanol	1 %	107
Glucose	2 %	106
Hemoglobin	7.5 g/L	92
Human albumin	0.5 %	106

Oxalic acid	2 mg/mL	107
Sodium chloride	0.5 M	108
Sodium chloride	1 M	111
Urea	6 %	102

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results.[15]

ACTION REQUIRED

Special Wash Programming: The use of special wash steps is mandatory when certain test combinations are run together on **cobas c** systems. The latest version of the carry-over evasion list can be found with the NaOHD-SMS-SmpCln1+2-SCCS Method Sheets. For further instructions refer to the operator's manual. **cobas c** 502 analyzer: All special wash programming necessary for avoiding carry-over is available via the **cobas** link, manual input is required in certain cases.

Where required, special wash/carry-over evasion programming must be implemented prior to reporting results with this test.

Expected values

Qualitative assay

Results of this assay distinguish preliminary positive (≥ 20 ng/mL, ≥ 50 ng/mL, or ≥ 100 ng/mL depending on the cutoff) from negative samples only. The amount of drug detected in a preliminary positive sample cannot be estimated.

Semiquantitative assay

Results of this assay yield only approximate cumulative concentrations of the drug and its metabolites (see "Analytical specificity" section).

Specific performance data

Representative performance data on a Roche/Hitachi analyzer are given below. Results obtained in individual laboratories may differ.

Precision

Precision was determined in an internal protocol by running a series of calibrator and controls (repeatability n = 20, intermediate precision n = 100). The following results were obtained on a **cobas c** 501 analyzer.

Semiquantitative precision - 20 ng/mL

Repeatability	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	18	1	3.0
Level 2	19	1	2.7
Level 3	26	1	3.3

Intermediate precision	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	17	1	5.4
Level 2	20	1	4.7
Level 3	27	2	6.0

Qualitative precision - 20 ng/mL

Cutoff (20)	Number tested	Correct results	Confidence level
0.75x	100	100	> 95 % negative reading
1.25x	100	100	> 95 % positive reading

Semiquantitative precision - 50 ng/mL

Repeatability	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	37	1	3.2
Level 2	45	2	4.1
Level 3	72	2	2.6

Intermediate precision	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	38	2	4.9
Level 2	47	3	5.4
Level 3	65	4	6.0

Qualitative precision - 50 ng/mL

Cutoff (50)	Number tested	Correct results	Confidence level
0.75x	100	100	> 95 % negative reading
1.25x	100	100	> 95 % positive reading

Semiquantitative precision - 100 ng/mL

Repeatability	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	85	3	3.4
Level 2	96	3	2.9
Level 3	124	4	2.8

Intermediate precision	*Mean ng/mL*	*SD ng/mL*	*CV %*
Level 1	77	5	6.5
Level 2	98	6	5.6
Level 3	130	10	7.7

Qualitative precision - 100 ng/mL

Cutoff (100)	Number tested	Correct results	Confidence level
0.75x	100	100	> 95 % negative reading
1.25x	100	100	> 95 % positive reading

Accuracy

100 urine samples, obtained from a clinical laboratory where they screened negative in a drug test panel, were evaluated with the Cannabinoids II assay. 100 % of these normal urines were negative relative to the 20 ng/mL, 50 ng/mL and 100 ng/mL cutoffs. 52 samples obtained from a clinical laboratory, where they screened preliminary positive with a commercially available immunoassay and were subsequently confirmed by GC-MS, were evaluated with the Cannabinoids II assay. 100 % of these samples were positive relative to the 20 ng/mL, 50 ng/mL and 100 ng/mL cutoffs. In addition, 10 samples were diluted to a Δ^9 COOH-THC concentration of 75-100 % of the cutoff concentration for each cutoff; and 10 samples were diluted to a Δ^9 COOH-THC concentration of 100-125 % of the cutoff concentration for each cutoff. Data from the accuracy studies described above that fell within the near cutoff value ranges were combined with data generated from diluted positive urine samples. The following results were obtained with the Cannabinoids II assay on the Roche/Hitachi 917 analyzer relative to the GC-MS values.

Cannabinoids II Clinical Correlation (Cutoff = 20 ng/mL)					
		Negative Samples	GC-MS values (ng/mL)		
			Near Cutoff		28-981
			15	20-25	
Roche/Hitachi 917 analzyer	+	0	0	16	46
	-	100	10	0	0

Cannabinoids II Clinical Correlation (Cutoff = 50 ng/mL)					
		Negative Samples	GC-MS values (ng/mL)		
			Near Cutoff		64-338
			30-49	50-63	
Roche/Hitachi 917 analzyer	+	0	7	17	38
	-	100	10	0	0

Cannabinoids II Clinical Correlation (Cutoff = 100 ng/mL)					
		Negative Samples	GC-MS values (ng/mL)		
			Near Cutoff		143-779
			75	110-125	
Roche/Hitachi 917 analzyer	+	0	0	16	46
	-	100	10	0	0

Additional clinical samples were evaluated with this assay on a **cobas c** 501 analyzer and a Roche/Hitachi 917 analyzer. 100 urine samples, obtained from a clinical laboratory where they screened negative in a drug test panel, were evaluated with the Cannabinoids II assay. 100 % of these normal urines were negative for all cutoffs relative to the Roche/Hitachi 917 analyzer. 83 urine samples for the 20 ng/mL cutoff, 60 urine samples for the 50 ng/mL cutoff, and 87 urine samples for the 100 ng/mL cutoff, obtained from a clinical laboratory where they screened preliminary positive with a commercially available immunoassay and were subsequently confirmed by GC-MS, were evaluated with the Cannabinoids II assay. At the 20 ng/mL cutoff, 99 % of the samples were positive on both the **cobas c** 501 analyzer and the Roche/Hitachi 917 analyzer. At the 50 ng/mL and 100 ng/mL cutoffs, 100 % of the samples were positive on both the **cobas c** 501 analyzer and the Roche/Hitachi 917 analyzer.

Cannabinoids II Correlation (Cutoff = 20 ng/mL)			
		Roche/Hitachi 917 analyzer	
		+	-
cobas c 501 analyzer	+	82	0
	-	0	101

Cannabinoids II Correlation (Cutoff = 50 ng/mL)			
		Roche/Hitachi 917 analyzer	
		+	-
cobas c 501 analyzer	+	60	0
	-	0	100

Cannabinoids II Correlation (Cutoff = 100 ng/mL)			
		Roche/Hitachi 917 analyzer	
		+	-
cobas c 501 analyzer	+	87	0
	-	0	100

Analytical specificity

The specificity of this assay for various cannabinoids and cannabinoid metabolites was determined by generating inhibition curves for each of the compounds listed and determining the approximate quantity of each compound that is equivalent in assay reactivity to the 20 ng/mL, 50 ng/mL and 100 ng/mL Δ^9 COOH-THC assay cutoff. The following results were obtained on a Roche/Hitachi 917 analyzer.

Compound	ng/mL Equivalent to 20 ng/mL Δ^9 COOH-THC	Approximate % Cross-reactivity
9-carboxy-11-nor-Δ^8 THC	28	71.9
9-carboxy-11-nor-Δ^9 THC glucuronide	45	44.1
8-β-11-dihydroxy-Δ^9 THC	60	33.9
8-α-hydroxy-Δ^9 THC	154	13.0
11-hydroxy-Δ^9 THC	172	11.6
Cannabinol	3333	0.6
Δ^9 THC	3333	0.6

Compound	ng/mL Equivalent to 50 ng/mL Δ^9 COOH-THC	Approximate % Cross-reactivity
9-carboxy-11-nor-Δ^8 THC	73	69.0
9-carboxy-11-nor-Δ^9 THC glucuronide	93	54.0
8-β-11-dihydroxy-Δ^9 THC	162	30.9
8-α-hydroxy-Δ^9 THC	338	14.8
11-hydroxy-Δ^9 THC	376	13.3
Cannabinol	8333	0.6
Δ^9 THC	25000	0.2

Compound	ng/mL Equivalent to 100 ng/mL Δ^9 COOH-THC	Approximate % Cross-reactivity
9-carboxy-11-nor-Δ^8 THC	145	68.8
9-carboxy-11-nor-Δ^9 THC glucuronide	174	57.5
8-β-11-dihydroxy-Δ^9 THC	283	35.3
8-α-hydroxy-Δ^9 THC	485	20.6
11-hydroxy-Δ^9 THC	581	17.2
Cannabinol	25000	0.4
Δ^9 THC	33333	0.3

Drug interference

The following compounds were added to aliquots of pooled normal human urine at a concentration of 100000 ng/mL. None of these compounds gave values in the assay that were equal to or greater than 0.015 % cross-reactivity and no results were greater than the assay cutoffs (20 ng/mL, 50 ng/mL and 100 ng/mL).

Acetaminophen
Acetylsalicylic acid
Aminopyrine
Amitriptyline
Amobarbital
Amoxicillin
d-Amphetamine
Ampicillin
Ascorbic acid
Aspartame
Atropine
Benzocaine
Benzoylecgonine (cocaine metabolite)
Benzphetamine
Ibuprofen
Imipramine
Isoproterenol
Ketamine
Lidocaine
LSD
Mefloquine
Melanin
Meperidine
Methadone
d-Methamphetamine
Methaqualone
Methyprylon
Morphine sulfate
Naloxone

Butabarbital	Naltrexone
Caffeine	Naproxen
Calcium hypochlorite	Niacinamide
Captopril	Nifedipine
Chlordiazepoxide	Norethindrone
Chloroquine	Norpseudoephedrine
Chlorpheniramine	Omeprazole
Chlorpromazine	Oxazepam
Dextromethorphan	Pantoprazole
Dextropropoxyphene	Penicillin G
Diazepam	Pentazocine
Digoxin	Pentobarbital
Diphenhydramine	Phencyclidine
Diphenylhydantoin	Phenobarbital
Dopamine	Phenothiazine
Ecgonine	Phenylbutazone
Ecgonine methyl ester	Phenylpropanolamine
Enalapril	Procaine
Ephedrine	Promethazine
Epinephrine	*d*-Pseudoephedrine
Erythromycin	*l*-Pseudoephedrine
Estriol	Quinidine
Fenoprofen	Quinine
Fluoxetine	Ranitidine
Flurbiprofen	Secobarbital
Furosemide	Sulindac
Gentisic acid	Tetracycline
Glutethimide	Tetrahydrozoline
Guaiacol glycerol ether	Tolmetin
Hydrochlorothiazide	Trifluoperazine
5-Hydroxyindole-3 acetic acid	Verapamil
5-Hydroxyindole-2 carboxylic acid	Zomepirac

For the 20 ng/mL cutoff, the cross-reactivity for Niflumic Acid, at a concentration of 1250 ng/mL, is 2 %. For the 50 ng/mL cutoff, the cross-reactivity for Niflumic Acid, at a concentration of 4750 ng/mL, is 1 %. For the 100 ng/mL cutoff, the cross-reactivity for Niflumic Acid, at a concentration of 10897 ng/mL, is 1 %.

References

1 Karch SB, ed. Drug Abuse Handbook. Boca Raton, FL: CRC Press LLC 1998.

2 Tinklenberg JR, Darley CF. Psychological and cognitive effects of cannabis. In: Connell H, Dorn N, eds. Cannabis and Man: Proceedings of Third International Cannabinoids Conference, London: Churchill Livingstone 1975.

3 Klonoff H. Marijuana and driving in real-life situations. Science 1974;186:317-324.

4 Melges FT, Tinklenberg JR, Hollister LE, et al. Temporal disintegration and depersonalization during marijuana intoxication. Arch Gen Psychiatry 1970;23:204-210.

5 Lemberger L, Tamarkin NR, Axelrod J, et al. Delta-9-tetrahydrocannabinol: metabolism and disposition in long-term marijuana smokers. Science 1971 Jul 2;173(3991):72-74.

6 Armbruster DA, Schwarzhoff RH, Pierce BL, et al. Method comparison of EMIT II and ONLINE with RIA for drug screening. J Forensic Sci 1993;38:1326-1341.

7 Armbruster DA, Schwarzhoff RH, Hubster EC, et al. Enzyme immunoassay, kinetic microparticle immunoassay, radioimmunoassay, and fluorescence polarization immunoassay compared for drugs-of-abuse screening. Clin Chem 1993;39:2137-2146.

8 Antonian E, McNally AJ, Ng C, et al. An Abuscreen immunoassay for THC metabolites in urine on the Olympus AU5000 Series Clinical Analyzers. In: American Academy of Forensic Sciences. Program: The Forensic Sciences and Government. Abstract 1991;177.

9 Toxicology and Drug Testing in the Clinical Laboratory; Approved Guideline. 2nd ed. (C52-A2). Clinical and Laboratory Standards Institute 2007;27:33.

10 Decker WJ. Laboratory support of drug abuse control programs: An overview. Clinical Toxicology 1977;10(1):28.

11 Mandatory Guidelines for Federal Workplace Drug Testing Programs. Fed Regist 2008 Nov 25;73:71858-71907.

12 Cone EJ, Johnson RE, Darwin WD, et al. Passive inhalation of marijuana smoke: Urinalysis and room air levels of Δ9-tetrahydrocannabinol. J Anal Toxicol 1987;11:89-96.

13 Perez-Reyes M, diGuiseppi S, Mason AP, et al. Passive inhalation of marijuana smoke and urinary excretion of cannabinoids. Clin Pharmacol Ther 1983;34(1):36-41.

14 Mulé SJ, Lomax P, Gross SJ. Active and realistic passive marijuana exposure tested by three immunoassays and GC/MS in urine. J Anal Toxicol 1988;12:113-116.

15 Bakker AJ, Mücke M. Gammopathy interference in clinical chemistry assays: mechanisms, detection and prevention. Clin Chem Lab Med 2007;45(9):1240-1243.

A point (period/stop) is always used in this Method Sheet as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols

Roche Diagnostics uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard (for USA: see dialog.roche.com for definition of symbols used):

CONTENT	Contents of kit
→	Volume after reconstitution or mixing
GTIN	Global Trade Item Number

FOR US CUSTOMERS ONLY: LIMITED WARRANTY

Roche Diagnostics warrants that this product will meet the specifications stated in the labeling when used in accordance with such labeling and will be free from defects in material and workmanship until the expiration date printed on the label. THIS LIMITED WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE. IN NO EVENT SHALL ROCHE DIAGNOSTICS BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES.

Roche Diagnostics GmbH, Sandhofer Strasse 116, D-68305 Mannheim
www.roche.com

Distribution in USA by:
Roche Diagnostics, Indianapolis, IN
US Customer Technical Support 1-800-428-2336