

# LZI Oral Fluid Cocaine Metabolite (Benzoylecgonine) Enzyme Immunoassay

REF S0030d (75/37.5 mL R<sub>1</sub>/R<sub>2</sub> Kit)  
S0031d (750/375 mL R<sub>1</sub>/R<sub>2</sub> Kit)



**FOR RESEARCH & DEVELOPMENT USE ONLY**



**Lin-Zhi International, Inc.**

## Intended Use

The Lin-Zhi International, Inc. (LZI) Oral Fluid Cocaine Metabolite (Benzoylecgonine) Immunoassay is a homogeneous enzyme immunoassay intended for the qualitative and semi-quantitative determination of cocaine metabolite in neat human oral fluid, collected into an LZI Oral Fluid Collector, at the cutoff value of 20 ng/mL. The assay is designed for prescription use with a number of automated clinical chemistry analyzers. This is a non-FDA approved assay for Research & Development use only and as such should not be repackaged for in vitro diagnostic use.

**The assay provides a rapid screening procedure for determining the presence of benzoylecgonine (cocaine metabolite) in human oral fluid. The assay provides only a preliminary analytical result. A more specific alternative analytical chemistry method must be used in order to obtain a confirmed analytical result. Gas or Liquid Chromatography/Mass Spectrometry (GC/MS or LC/MS) is the preferred confirmatory method (1, 2). Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.**

## Summary and Explanation of Test

Cocaine is an alkaloid found in the plant *Erythroxylon coca*, which is principally grown in South America. Cocaine is a CNS stimulant; however, it also exhibits numerous undesirable side effects including cardiac toxicity and behavioral responses such as paranoia and hallucinations. The most important action of cocaine clinically is its ability to block nerve conductance upon local application (3).

Cocaine sold on the street includes its hydrochloride salt and crack forms. It is a highly abused drug and appears rapidly in oral fluid after intravenous injection, smoking, and intranasal administration (4, 5). The concentration of cocaine is usually higher in oral fluid than in plasma because of ion trapping (4, 5). Benzoylecgonine and ecgonine methyl ester, major metabolites of cocaine, have longer half-lives in oral fluid than the parent drug (4, 6-11, 13).

## Assay Principle

The LZI Oral Fluid Cocaine Metabolite (Benzoylecgonine) Enzyme Immunoassay is a homogeneous enzyme immunoassay with ready-to-use liquid reagents. The assay is based on competition between drug in the sample and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for a fixed amount of antibody in the reagent (12). Enzyme activity decreases upon binding to the antibody, and the drug concentration in the sample is measured in terms of enzyme activity. In the absence of drug in the sample, benzoylecgonine-labeled G6PDH conjugate is bound to antibody, and the enzyme activity is inhibited. On the other hand, when drug is present in the sample, antibody binds to free drug and the unbound benzoylecgonine-labeled G6PDH then exhibits its maximal enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that can be measured spectrophotometrically at 340 nm.

## Reagents Provided

**Antibody/Substrate Reagent (R<sub>1</sub>):** Contains mouse monoclonal anti-benzoylecgonine antibody, glucose-6-phosphate (G6P), nicotinamide adenine dinucleotide (NAD), stabilizers, and sodium azide (0.09 %) as a preservative.

**Enzyme-drug Conjugate Reagent (R<sub>2</sub>):** Contains benzoylecgonine-labeled glucose-6-phosphate dehydrogenase (G6PDH) in buffer with sodium azide (0.09 %) as a preservative.

## Calibrators and Controls\*

\*Calibrators and Controls are sold separately and contain a negative synthetic oral fluid matrix with sodium azide as a preservative.

ORAL FLUID COCAINE METABOLITE (BENZOYLECGONINE) Calibrator/Control	REF #
Oral Fluid LC Negative Calibrator	S0007d
Low Calibrator: Contains 10 ng/mL benzoylecgonine	S0033d
Cutoff Calibrator: Contains 20 ng/mL benzoylecgonine	S0034d
Intermediate Calibrator: Contains 35 ng/mL benzoylecgonine	S0035d
High Calibrator: Contains 50 ng/mL benzoylecgonine	S0036d
Level 1 Control: Contains 15 ng/mL benzoylecgonine	S0037d
Level 2 Control: Contains 25 ng/mL benzoylecgonine	S0038d

## Collectors \*\*

\*\*Collectors are sold separately.

ORAL FLUID Collector	REF #
LZI Oral Fluid Collector -50 mL Polypropylene Centrifuge Tube	S0000b

## Precautions and Warning

- This test is a non-FDA approved assay and is for Research & Development use only. This test should not be repackaged for in vitro diagnostic use.
- Harmful if swallowed.
- Reagent contains sodium azide as a preservative, which may form explosive compounds in metal drain lines. When disposing such reagents or wastes, always flush with a large volume of water to prevent azide build-up. See National Institute for Occupational Safety and Health Bulletin: Explosive Azide Hazards (8/16/76).
- Do not use the reagents beyond their expiration dates.

## Reagent Preparation and Storage

The reagents are ready to use. No reagent preparation is required. All assay components should be stored refrigerated at 2-8°C when not in use.

## Specimen Storage and Shipping

**Note:** If oral fluid samples cannot be analyzed immediately, they may be stored in amber glass vials and refrigerated (2-8°C) for up to 21 days or frozen (-20°C) for up to 21 days. Studies have been performed up to 21 days to show benzoylecgonine is stable in oral fluid. No further study was conducted beyond 21 days.

Samples should always be shipped cold (2-8°C), packed in gel ice, and shipped for next day delivery (within 24 hours). Failure to store or ship samples under these conditions may result in a significant decrease in recovery of analyte. Please see additional details in the Specimen Collection and Handling section below.

## Specimen Collection and Handling

Oral fluid samples should be collected into a device without an absorbing pad, such as the LZI Oral Fluid Collector (a 50 mL polypropylene centrifuge tube) (14).

Prior to testing, samples should be frozen overnight (at minimum) and then allowed to thaw at room temperature. Samples should then be spun for five minutes at 3000 rpm to remove particulates. Only the clear top layer should be assayed for EIA testing and/or confirmatory testing. Samples should be at room temperature (18-25°C) for testing.

Samples do not require dilution or any additional correction factors.

Fresh and properly stored oral fluid samples should be within the normal pH range of 6-8; however, any sample with pH ranging from 3-10 can be tested without any pretreatment of the samples.

*Handle all oral fluid specimens as if they are potentially infectious.*

## Instrument

Clinical chemistry analyzers capable of maintaining a constant temperature, pipetting sample, mixing reagents, measuring enzyme rates at 340 nm, and timing the reaction accurately can be used to perform this homogeneous immunoassay. Performance characteristics presented in this package insert have been validated on the Hitachi 717. If other instruments are used, performance will need to be validated by the laboratory.

## Assay Procedure

Analyzers with specifications indicated above are suitable for performing this homogeneous enzyme immunoassay. Refer to the specific parameters used for each analyzer before performing the assay. Typical assay parameters used for the Hitachi 717 analyzer include a 60 µL sample, 150 µL of antibody reagent (R<sub>1</sub>), and 75 µL of enzyme conjugate reagent (R<sub>2</sub>) in 37°C incubation temperature, 27-30 reading frames, and 340 nm primary wavelength.

For qualitative analysis, use the 20 ng/mL cutoff calibrator. For semi-quantitative analysis, use all five calibrators and two controls. Recalibration should be performed after reagent bottle change or a change in calibrators or reagent lot. Two levels of controls are also available for monitoring the cutoff level: 15 ng/mL and 25 ng/mL.

## Calibration and Quality Control

Good laboratory practices recommend the use of at least two levels of control specimens (one positive and one negative control near the cutoff) to ensure proper assay performance. Controls should be run with each new calibration and after specific maintenance or troubleshooting procedures as detailed in the instrument system manual. Each laboratory should establish its own control frequency. If any trends or sudden change in control value are observed, review all operating parameters, or contact LZI technical support for further assistance. Laboratories should comply with all federal, state, and local laws, guidelines, and regulations.

## Results

**Note:** A positive test result does not always mean a person took illegal drugs and a negative test result does not always mean a person did not take illegal drugs. There are number of factors that influence the reliability of drug tests.

**Qualitative:** The cutoff calibrator, which contains 20 ng/mL of benzoylecgonine, is used as a reference for distinguishing positive from negative samples. A sample with a change in absorbance (mAU/min) equal to or greater than that obtained with the cutoff calibrator is considered positive. A sample with a change in absorbance (mAU/min) lower than that obtained with the cutoff calibrator is considered negative.

**Semi-Quantitative:** The semi-quantitative mode is for purposes of (1) enabling laboratories to determine an appropriate dilution of the specimen for verification by a confirmatory method such as GC/MS or LC/MS, or (2) permitting laboratories to establish quality control procedures. When an approximation of concentration is required, a calibration curve can be established with five calibrators. The concentration of benzoylecgonine in the sample may then be estimated from the calibration curve.

## Limitations

1. A positive result from the assay indicates only the presence of cocaine metabolite (benzoylecgonine). The test is not intended for quantifying this single analyte in samples.
2. A positive result does not necessarily indicate drug abuse.
3. A negative result does not necessarily mean a person did not take cocaine metabolite (benzoylecgonine).
4. There is a possibility that other substances and/or factors not listed above may interfere with the test and cause incorrect results (e.g., technical or procedural error, fluid intake, endogenous or exogenous interferents).
5. Positive results should be confirmed by other affirmative, analytical chemistry methods (e.g., chromatography), preferably GC/MS or LC/MS.
6. The test is designed for use with human oral fluid only.

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14. LZI Oral Fluid Sample Preparation Sheet.

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