

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE**

A. 510(k) Number:

k050945

B. Purpose for Submission:

Clearance of new device

C. Measurand:

Benzoylcegonine

D. Type of Test:

Qualitative Enzyme Immunoassay

E. Applicant:

Lin-Zhi International, Inc.

F. Proprietary and Established Names:

LZI Oral Fluid Cocaine Metabolite Enzyme Immunoassay
LZI Oral Fluid Cocaine Metabolite Calibrators
LZI Oral Fluid Cocaine Metabolite Controls

G. Regulatory Information:

1. Regulation section:

21 CFR §862.3250, Cocaine and cocaine metabolite test system
§862.3200, Clinical toxicology calibrator
§862.3280, Clinical toxicology control material

2. Classification:

Class II

3. Product code:

DIO, enzyme immunoassay, cocaine and cocaine metabolites
DLJ, calibrators, drug specific
LAS, drug specific control materials

4. Panel:

Toxicology (91)

H. Intended Use:

1. Intended use(s):

See indications for use below.

2. Indication(s) for use:

The Cocaine Metabolite (Benzoylecgonine) Enzyme Immunoassay for Drugs of Abuse in Oral Fluid is a homogeneous enzyme immunoassay system to detect cocaine metabolite in human saliva with a cutoff of 15 ng/mL when testing oral fluid specimen collected with Salivette collector (manufactured by Sarstedt) and diluted with 1 mL of buffer. The calibrators and controls of the analyte (Benzoylecgonine) are prepared with oral fluid buffer so that it can be used to verify and validate the assay. The assay is intended for use in the qualitative determination for cocaine/cocaine metabolite drugs. The assay is designed for professional use with a number of automated clinical chemistry analyzers.

The Cocaine Metabolite (Benzoylecgonine) Oral Fluid Enzyme Immunoassay is a homogeneous enzyme immunoassay system 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. Clinical consideration and professional judgement should be applied to any drug-of-abuse test result, particularly when preliminary positive results are used.

3. Special conditions for use statement(s):

For prescription, professional use only in clinical chemistry laboratories.

The assay is not designated for use in point-of-care settings.

4. Special instrument requirements:

The assay is designed for professional use with a number of clinical chemistry analyzers. Performance data submitted was obtained using the Hitachi 717 analyzer.

I. Device Description:

The assay consists of a ready-to-use liquid reagent containing antibodies against benzoylecgonine. The calibrators and controls are sold separately. See below for

additional information about calibrators and controls.

J. Substantial Equivalence Information:

1. Predicate device name(s):

LZI Cocaine Metabolite EIA
Dade Behring Enzyme immunoassay, Cocaine and Cocaine Metabolites
OraSure Cocaine Metabolite Intercept Micro-plate oral fluid EIA

2. Predicate 510(k) number(s):

k020763
k033713
k001197

3. Comparison with predicate:

The device and the predicate devices share a similar intended use. The device uses similar reagents and test principle as the LZI urine assay, and the device is intended for the same matrix as the OraSure assay.

K. Standard/Guidance Document Referenced (if applicable):

None referenced.

L. Test Principle:

The assay is based on competition for anti-benzoylcegonine antibody binding sites between benzoylcegonine in the sample and benzoylcegonine conjugated to glucose-6-phosphate dehydrogenase (G6PDH). In the absence of free drug in the sample, the antibody binds the conjugated benzoylcegonine thus decreasing the enzymatic activity of the G6PDH. The G6PDH activity is measured spectrophotometrically at 340 nm because of conversion of NAD to NADH.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

Precision studies were performed by using the negative, cutoff and high calibrators and two levels of controls. Testing was performed in replicates of 6, twice a day for 10 days for all concentrations. The within-run % CV ranged from 0.71 to 0.81% and the Total precision %CV ranged from 0.83 to 0.89%.

The recovery study showed that the assay correctly identified spiked samples

at approximately 50% above the cutoff as positive and at approximately 50% below the cutoff as negative.

b. Linearity/assay reportable range:

Not applicable. This is a qualitative assay.

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

A commercially available standard solution is made into a secondary (lower concentration) stock solution. The secondary stock solution is then spiked into the calibrators and controls to the desired concentration. The concentrations are confirmed by GC/MS.

Stability Studies:

Real time and accelerated studies have been conducted. Protocols and acceptance criteria were described and found to be acceptable. The manufacturer claims the following expiration date:

When stored at 2-8 °C product is good until expiration date which is 18 months.

Stability of benzoylecgonine in the Salivette collection device was determined by taking a pool of negative oral fluid samples spiked at three different concentrations and split into three hundred and thirty-three samples. On day one 10 samples were run to determine the baseline that subsequent runs were compared to. Of the remaining one hundred samples for each concentration half were stored at 2-8 °C and the other half were stored frozen -20 °C. The study was conducted over 22 days and samples were run on days 1, 2, 5, 8, 14 and 22. The sample is stable for 22 days when stored at refrigerator 2-8 °C or frozen -20 °C.

d. Detection limit:

See the Precision/Reproducibility section above for performance around the stated cutoff concentration.

e. Analytical specificity:

Various potentially interfering substances were evaluated to determine whether they interfere with assay results. Test compounds were spiked into the drug-free calibrator to various concentrations and evaluated against the cutoff calibrator. The labeling lists the concentration of each compound that gave a response approximately equal to that of the cutoff calibrator (as positive) or the maximal concentration of compound tested that remained

negative. The only compound that was seen to significantly cross-react was the cocaine (see below).

Compound	ng/mL Positive
Benzoylecgonine	10
Cocaine	60
Ecgonine, methyl ester	5000

f. Assay cut-off:

The stated cutoff of this assay, which includes the dilution of the sample with the Salivette collection device, is 15 ng/mL. Characterization of how the device performs analytically around the claimed cutoff concentration appears in the precision/reproducibility section above.

2. Comparison studies:

a. Method comparison with predicate device:

One hundred and eighteen clinical oral fluid specimens were collected. The oral fluid specimens were tested with LZI Oral Fluid Cocaine Metabolite Enzyme Immunoassay and compared to a Gas Chromatography/ Mass Spectrophotometer (GC/MS).

Results from the study are presented below. The table describes the agreement between the device and the GC/MS.

		GC/MS	
		Positive	Negative
LZI EIA	Positive	72	5*
	Negative	0	41

*Five samples contain less than 15 ng/mL of Benzoylecgonine, but all have traces of the parent cocaine analyte.

% Agreement = 95.7%

b. Matrix comparison:

Not applicable. This device is intended for use with only one matrix.

3. Clinical studies:

a. Clinical Sensitivity:

Not applicable

b. Clinical specificity:

Not applicable

c. Other clinical supportive data (when a. and b. are not applicable):

Not applicable

4. Clinical cut-off:

Not applicable

5. Expected values/Reference range:

Not applicable

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.