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

A. 510(k) Number:

k172416

B. Purpose for Submission:

Adding a previously cleared test to the Synermed IR-500 Chemistry Analyzer

C. Measurand:

Opiates

D. Type of Test:

Competitive enzyme immunoassay; qualitative and semi-quantitative

E. Applicant:

Infrared Laboratory Systems, LLC

F. Proprietary and Established Names:

Synermed Opiate Enzyme Immunoassay

G. Regulatory Information:

Product Code	Classification	Regulation Section	Panel
DJG	Class II	21 CFR 862.3650, Opiate test system	Toxicology (91)

H. Intended Use:

1. Intended use(s):

   Refer to Indications for Use below.

2. Indication(s) for use:

   The Synermed Enzyme Immunoassay is intended for the qualitative and semi-quantitative determination of opiates in human urine at a cutoff value of 300 ng/mL when calibrated against morphine. The assay is designed for professional use with a number of automated clinical chemistry analyzers. This assay is for

prescription use only. The semi-quantitative mode is for purposes of enabling laboratories to determine an appropriate dilution of the specimen for confirmatory method such as GCMS or permitting laboratories to establish quality control procedures.

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) are the preferred confirmatory methods. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.

3. Special conditions for use statement(s):

   For prescription use only.
   For in vitro diagnostic use only.

4. Special instrument requirements:

   Synermed IR-500 Chemistry Analyzer

I. Device Description:

The Synermed Opiate Enzyme Immunoassay is ready to use and consists of the following components:

- Antibody/Substrate Reagent (R1): Contains mouse monoclonal anti-morphine antibody, opiate-6-phosphate (G6P), nicotinamide adenine dinucleotide (NAD), stabilizers, and sodium azide (0.09 %) as a preservative.
- Enzyme-drug Conjugate Reagent (R2): Contains morphine-labeled opiate-6-phosphate dehydrogenase (G6PDH) in buffer with sodium azide (0.09 %) as a preservative.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   LZI Opiate Enzyme Immunoassay on Hitachi 717 Chemistry Analyzer

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

   k110298

3. Comparison with predicate:

Opiate Enzyme Immunoassay:

Similarities and Differences		
Item	**Candidate Device: Synermed Opiate Enzyme Immunoassay**	**Predicate Device: LZI Opiate Enzyme Immunoassay on Hitachi 717 Chemistry Analyzer (k110298)**
Intended Use	For the qualitative and semi-quantitative determination of opiates in human urine	Same
Test Principle or Method	Competitive enzyme immunoassay	Same
Sample Type	Urine	Same
Cutoff	300 ng/mL	Same
Instrument use for	Synermed IR-500 analyzer	Hitachi 717 analyzer

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

CLSI EP5-A3: "Evaluation of Precision of Quantitative Measurement Procedures: Approved Guideline-Third Edition"

CLSI EP12-A2: "User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline-Second Edition"

CLSI EP17-A2: "Evaluation of Detection Capability for Clinical Laboratory Measurement"

L. Test Principle:

The Opiate Enzyme Immunoassay is a competitive enzyme immunoassay 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. 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, morphine-labeled G6PDH conjugate is bound to antibody and enzyme activity is inhibited. When free drug is present in the sample antibody binds to the free drug, the unbound morphine-labeled G6PDH then exhibits its maximum enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH resulting in an absorbance change measured spectrophotometrically at 340 nm.

M. Performance Characteristics:

1. Analytical performance:

   a. *Precision/Reproducibility:*

   The precision studies were performed on the Synermed IR-500 by measuring eleven levels of human urine pools for opiate (0, 75, 150, 225, 300, 375, 450, 525, 600, 800, and 1000 ng/mL). Each sample was run in duplicate twice a day for twenty days for a total of 80 measurements at each concentration in both qualitative and semi-quantitative modes. The data are summarized in the following tables:

   Semi quantitative analysis (300 ng/mL cutoff)

Concentration as a % of the Cut-off Level	Target Concentration (ng/mL)	Results
0	0	80 Negative / 0 Positive
25	75	80 Negative / 0 Positive
50	150	80 Negative / 0 Positive
75	225	80 Negative / 0 Positive
100	300	7 Negative / 73 Positive
125	375	80 Positive / 0 Negative
150	450	80 Positive / 0 Negative
175	525	80 Positive / 0 Negative
200	600	80 Positive / 0 Negative
267	800	80 Positive / 0 Negative
333	1000	80 Positive / 0 Negative

   Qualitative Analysis

Concentration as a % of the Cut-off Level	Target Concentration (ng/mL)	Results
0	0	80 Negative / 0 Positive
25	75	80 Negative / 0 Positive
50	150	80 Negative / 0 Positive
75	225	80 Negative / 0 Positive
100	300	0 Negative / 80 Positive
125	375	80 Positive / 0 Negative
150	450	80 Positive / 0 Negative
175	525	80 Positive / 0 Negative
200	600	80 Positive / 0 Negative

Concentration as a % of the Cut-off Level	Target Concentration (ng/mL)	Results
267	800	80 Positive / 0 Negative
333	1000	80 Positive / 0 Negative

b. Linearity/assay reportable range:

To demonstrate linearity, a drug recovery study in the semi-quantitative mode was conducted on the Synermed IR-500 by measuring twelve levels of human urine pools (Samples were prepared by intermixing a high urine pool with a low urine pool to obtain twelve concentrations across the measuring range: 0, 25, 75, 150, 225, 300, 450, 600, 800, 1000, 1100, and 1250 ng/mL), using four replicates at each level. Each level of pooled human urine was confirmed by UHPLC-MSMS. The results confirmed acceptable recovery of samples tested.

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

Traceability

The calibrator to be used with this device were previously cleared under k020769.

d. Detection limit:

See section M.1.a. for device performance around the cutoff.

e. Analytical specificity:
Cross reactivity from structurally related compounds, as well as interference of exogenous and endogenous substances was evaluated in k110298.

f. Assay cut-off:

Analytical performance of the device around the claimed cutoff is described in the precision section above.

2. Comparison studies:

a. Method comparison with predicate device:

A method comparison study was performed using unaltered clinical urine samples. A total of 100 samples were analyzed in singlicate in both Qualitative and Semi-quantitative modes, and the results were compared to UHPLC-MSMS. The results from the study in the two modes were identical and are summarized in the table below.

Candidate Device Results	Negative	<50% of cutoff by LC/MS (< 150ng/mL)	Near Cutoff Negative (Between 50% below the cutoff and the cutoff by LC/MS) (150 ~ 299 ng/mL)	Near Cutoff Positive (Between the cutoff and 50% above the cutoff by LC/MS) (300 ~ 450 ng/mL)	High Positive (Greater than 50% above the cutoff by LC/MS) (> 450 ng/mL)
Positive	0	0	0	11	31
Negative	5	19	30	4*	0

*Discordant Results Table

Sample #	LC-MS/MS (ng/mL)	Semi-Quantitative Assay Result (ng/mL)	Qualitative Assay Result
50	321.82 (Positive)	265 (Negative)	Negative
53	306.20 (Positive)	267 (Negative)	Negative
57	314.80 (Positive)	297 (Negative)	Negative
58	327.67 (Positive)	294 (Negative)	Negative

b. Matrix comparison:

Not applicable. This device is intended to be used with urine samples only.

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.