DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
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Silver Spring, MD 20993-0002

LIN-ZHI INTERNATIONAL, INC.
BERNICE LIN
VP OPERATIONS
670 ALMANOR AVE.
SUNNYVALE CA 94085

May 28, 2015

Re: K141320
Trade/Device Name: LZI Oral Fluid Cannabinoids Enzyme Immunoassay,
LZI Oral Fluid Cannabinoids Calibrators
LZI Oral Fluid Cannabinoids Controls
Regulation Number: 21 CFR 862.3870
Regulation Name: Cannabinoid test system
Regulatory Class: II
Product Code: LDJ, DLJ, LAS
Dated: April 22, 2015
Received: April 23, 2015

Dear Bernice Lin:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the

electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulations (21 CFR Parts 801 and 809), please contact the Division of Industry and Consumer Education at its toll-free number (800) 638 2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Katherine Serrano -S

For:

Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: January 31, 2017
See PRA Statement below.

510(k) Number *(if known)*
k141320

Device Name
LZI Oral Fluid Cannabinoids Enzyme Immunoassay
LZI Oral Fluid Cannabinoids Calibrators
LZI Oral Fluid Cannabinoids Controls

Indications for Use *(Describe)*

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay is intended for the qualitative and semi-quantitative determination of Cannabinoids in neat human oral fluid, collected into the LZI Oral Fluid THC Collector, at the cut-off value of 4 ng/mL with Δ9- tetrahydrocannabinol (THC) as calibrators. The assay is designed for prescription use with a number of automated clinical chemistry analyzers.

The semi-quantitative mode is for purposes of (1) enabling laboratories to determine an appropriate dilution of the specimen for confirmation by a confirmatory method such as GCMS and LCMS or (2) permitting laboratories to establish quality control procedures.

The assay provides only a preliminary analytical result. A more specific alternative chemical 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. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.

The LZI Oral Fluid Cannabinoids Calibrators are for use as calibrators in the qualitative and semi-quantitative calibration of the LZI Oral Fluid Cannabinoids Enzyme Immunoassay at the cut-off value of 4 ng/mL.

The LZI Oral Fluid Cannabinoids Controls are for use as assayed quality control materials to monitor the precision of the LZI Oral Fluid Cannabinoids Enzyme Immunoassay at the cut-off value of 4 ng/mL.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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510(k) Summary of Safety and Effectiveness

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92.

Preparation Date

May 22, 2015

Introduction

According to the requirements of 21 CFR 807.92, the following information provides sufficient detail to understand the basis for a determination of substantial equivalence.

Submitter name, Address, and Contact

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e-mail: bclin@lin-zhi.com

Contact: Bernice Lin, Ph.D.
VP Operations

Device Name and Classification

Classification Name:	Enzyme Immunoassay, Oral Fluid Cannabinoids Class II, LAF (91 Toxicology), 21 CFR 862.3870 Drug Specific Calibrators, Class II, DLJ (91 Toxicology), 21 CFR 862.3200 Drug Specific Controls, Class I, LAS (91 Toxicology), 21 CFR 862.3280
Common Name:	Homogeneous Oral Fluid Cannabinoids Enzyme Immunoassay
Proprietary Name:	LZI Oral Fluid Cannabinoids Enzyme Immunoassay, LZI Oral Fluid Cannabinoids Calibrators LZI Oral Fluid Cannabinoids Controls

Legally Marketed Predicate Device(s)

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay (k141320) is substantially equivalent to the Lin-Zhi International, Inc. Cannabinoid (cTHC) Enzyme Immunoassay, Calibrators and Controls for Hitachi 717 Systems (k110239) manufactured by Lin-Zhi International, Inc. The LZI Oral Fluid Cannabinoids Enzyme Immunoassay is identical or similar to its predicate in terms of intended use, method principle, device components, and clinical performance.

Device Description

The LZI Oral Fluid Cannabinoids assay is a homogeneous enzyme immunoassay with ready-to-use liquid reagent. 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. 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, cannabinoid derivative-labeled G6PDH conjugate is bound to antibody, and the enzyme activity is inhibited. On the other hand, when free drug is present in the sample, antibody would bind to free drug, the unbound cannabinoid derivative-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.

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay is a kit comprised of two reagents, an R_1 and R_2 which are bottled separately but sold together within the kit.

The R_1 solution contains mouse monoclonal anti-Cannabinoids antibody, glucose-6-phosphate (G6P) nicotinamide adenine dinucleotide (NAD), stabilizers, and sodium azide (0.09%) as a preservative. The R_2 solution contains glucose-6-phosphate dehydrogenase (G6PDH) labeled with Cannabinoids, stabilizers, in buffer with sodium azide (0.09%) as preservative.

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay calibrators and controls designated for use at the 4 ng/mL cutoffs contain 0, 2, 3, 4, 5, 6, and 12 ng/mL of Δ^9-tetrahydrocannabinol (THC) in synthetic oral fluid with sodium azide (0.09%) as preservative. These five calibrators and two controls are sold as individual bottles.

Intended Use

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay is intended for the qualitative and semi-quantitative determination of cannabinoids in neat human oral fluid, collected into the LZI Oral Fluid THC Collector, at the cutoff value 4 ng/mL with Δ^9-tetrahydrocannabinol (THC) as calibrators. The assay is designed for prescription use with a number of automated clinical chemistry analyzers.

The semi-quantitative mode is for purposes of (1) enabling laboratories to determine an appropriate dilution of the specimen for confirmation by a confirmatory method such as GC/MS or LC/MS or (2) permitting laboratories to establish quality control procedures.

The assay provides only a preliminary analytical result. A more specific alternative chemical 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. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.

The LZI Oral Fluid Cannabinoids Calibrators are for use as calibrators in the qualitative and semi-quantitative calibration of the LZI Oral Fluid Cannabinoids Enzyme Immunoassay at the cutoff value 4 ng/mL.

The LZI Oral Fluid Cannabinoids Controls are for use as assayed quality control materials to monitor the precision of the LZI Oral Fluid Cannabinoids Enzyme Immunoassay at the cutoff value of 4 ng/mL.

Comparison to Predicate Device

The LZI Oral Fluid Cannabinoids Enzyme Immunoassay (k141320) is substantially equivalent to the Lin-Zhi International, Inc. Cannabinoid (cTHC) Enzyme Immunoassay, Calibrators and Controls for Hitachi 717 Systems cleared by the FDA under the premarket notification k110239 for its stated intended use.

The following table compares LZI's Oral Fluid Cannabinoids Enzyme Immunoassay (k141320) with the predicate device.

Device Characteristics	**Subject Device (k141320)** LZI Oral Fluid Cannabinoids Enzyme Immunoassay, Calibrators, and Controls	**Predicate Device (k110239)** LZI Cannabinoid (cTHC) Enzyme Immunoassay, Calibrators and Controls
Intended Use	The LZI Oral Fluid Cannabinoids Enzyme Immunoassay is intended for the qualitative and semi-quantitative determination of Δ^9-tetrahydrocannabinol (THC) in neat human oral fluid, collected into the LZI Oral Fluid THC Collector, using the cutoff value 4 ng/mL with Δ^9-tetrahydrocannabinol (THC) as the calibrator. The assay is designed for prescription use with a number of automated clinical chemistry analyzers. ***This assay provides a rapid screening procedure for determining the presence of cannabinoids in oral fluid. The assay provides only a preliminary analytical result. A more specific alternative chemical 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. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.***	The LZI Cannabinoids (cTHC) Enzyme Immunoassay, when used in conjunction with Hitachi 717 automated clinical system analyzers, is intended for the qualitative and semi-quantitative determination of Cannabinoids in human urine using 11-nor-Δ^9-THC-9-COOH (the major metabolite of THC referred to here as cTHC) as calibrator at the cutoff values of 25, 50, or 100 ng/mL. The assay is designed for professional use with a number of automated clinical chemistry analyzers. ***This assay provides a rapid screening procedure for determining the presence of Cannabinoids (cTHC) in urine. The assay provides only a preliminary analytical result. A more specific alternative chemical 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. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.***
Analyte	Δ^9-tetrahydrocannabinol (THC)	11-nor-Δ^9-THC-9-carboxylic acid (cTHC)
Cutoff	4 ng/mL	25, 50, 100 ng/mL
Matrix	Oral fluid	Urine
Calibrator Levels	5 Levels (0, 2, 4, 6, 12 ng/mL)	THC 25: 5 Levels (0, 12.5, 25, 37.5, 50 ng/mL) THC 50: 5 Levels (0, 25, 50, 75, 100 ng/mL) THC 100: 5 Levels (0, 50, 100, 150, 200 ng/mL)
Control Levels	2 Levels (3 ng/mL, 5 ng/mL)	THC 25: 2 Levels, (18.75 ng/mL, 31.25 ng/mL) THC 50: 2 Levels, (37.5 ng/mL, 62.5 ng/mL) THC 100: 2 Levels, (75 ng/mL, 125 ng/mL)
Storage	2-8 ºC until expiration date	2-8 ºC until expiration date

Performance Characteristics Summary:

Beckman AU400e Analyzer

Precision:

Precision:

Semi-Quantitative Positive/Negative Results:

4 ng/mL Cutoff Result:		Within Run Precision		Total Precision	
Sample Concentration	**% of Cutoff**	**Number of Determination**	**Immunoassay Result**	**Number of Determination**	**Immunoassay Result**
0 ng/mL	-100.0%	20	20 Negative	80	80 Negative
1 ng/mL	-75.0%	20	20 Negative	80	80 Negative
2 ng/mL	-50.0%	20	20 Negative	80	80 Negative
3 ng/mL	-25.0%	20	20 Negative	80	80 Negative
4 ng/mL	0%	20	17 Pos/ 3 Neg	80	54 Positive/ 26 Negative
5 ng/mL	+25.0%	20	20 Positive	80	80 Positive
6 ng/mL	+50.0%	20	20 Positive	80	80 Positive
7 ng/mL	+75.0%	20	20 Positive	80	80 Positive
8 ng/mL	+100.0%	20	20 Positive	80	80 Positive

Qualitative Positive/Negative Results:

4 ng/mL Cutoff Result:		Within Run Precision		Total Precision	
Sample Concentration	**% of Cutoff**	**Number of Determination**	**Immunoassay Result**	**Number of Determination**	**Immunoassay Result**
0 ng/mL	-100.0%	20	20 Negative	80	80 Negative
1 ng/mL	-75.0%	20	20 Negative	80	80 Negative
2 ng/mL	-50.0%	20	20 Negative	80	80 Negative
3 ng/mL	-25.0%	20	20 Negative	80	80 Negative
4 ng/mL	0%	20	18 Pos/ 2 Neg	80	59 Pos/ 21 Neg
5 ng/mL	+25.0%	20	20 Positive	80	80 Positive
6 ng/mL	+50.0%	20	20 Positive	80	80 Positive
7 ng/mL	+75.0%	20	20 Positive	80	80 Positive
8 ng/mL	+100.0%	20	20 Positive	80	80 Positive

Method Comparison: Clinical Samples

Forty two (42) positive and forty one (41) negative unaltered oral fluid samples were evaluated by the LZI Oral Fluid Cannabinoid Enzyme Immunoassay using the Beckman AU400e clinical analyzer and compared to GC/MS. All samples were collected using the LZI Oral Fluid Collector and were processed following insert instructions. Results from the study are presented below:

Qualitative Method Comparison Data:

4 ng/mL Cutoff	Negative	< 50 % of the cutoff concentration by GC/MS analysis	Near Cutoff Negative (Between 50 % below the cutoff and the cutoff concentration)	Near Cutoff Positive (Between the cutoff and 50 % above the cutoff concentration)	High Positive (Greater than 50 % above the cutoff concentration)
Positive	0	0	2*	5	35
Negative	20	13	6	2**	0

OF THC GC/MS concentration (ng/mL)	Assay Cut-off	EIA Qualitative Result
3.6*	4 ng/mL	+
3.9*		+
4.1**		-
4.8**		-

Semi-Quantitative Method Comparison Data:

4 ng/mL Cutoff	Negative	< 50 % of the cutoff concentration by GC/MS analysis	Near Cutoff Negative (Between 50 % below the cutoff and the cutoff concentration)	Near Cutoff Positive (Between the cutoff and 50 % above the cutoff concentration)	High Positive (Greater than 50 % above the cutoff Concentration)
Positive	0	0	1*	6	35
Negative	20	13	7	1**	0

OF THC GC/MS concentration (ng/mL)	Assay Cut-off	EIA Semi-Quantitative Result
2.8*	4 ng/mL	+
4.1**		-

Endogenous Compound Interference and Specificity - Cross-Reactivity:

No endogenous substance interference was observed when tested at physiologically relevant concentrations. Ascorbic Acid at concentrations above 2 mg/mL and pH levels 3, 4, and 5 can cause false-negative results. See product insert for list of compounds tested.

Exogenous Compound Interference and Specificity - Cross-Reactivity:

Few exogenous substance interferences were observed. Ethyl Alcohol at concentrations above 3 %V/V and Reduced Fat Milk (2% milk fat) at concentrations above 1 %V/V can cause false-negative results. See product insert for list of compounds tested.

Shipping/Recovery Stability Study:

No significant sample degradation occurred following real-time and accelerated stability studies up to 72 hours in amber glass vials. All sample shipments are shipped with gel-ice and are based on the assumption of a 24 hour priority overnight delivery.

Sample Storage Stability Study:

No significant sample degradation occurred following real-time stability studies on processed samples. Based on real-time studies, samples can be stored at 2-8 ºC for up to 22 Days or at -20 ºC for up to 29 Days in amber glass vials.

Open (and re-capped) vial Stability for Calibrator/Control:

Real time (2-8ºC) and accelerated stability studies (at room temperature, ~25ºC and 30ºC) were carried out for 446 Days (beyond 14 months) and results indicate that calibrators/controls are sensitive to temperature and must be stored at cold temperature (2-8ºC). We claim an open (re-capped)-vial stability up to 12 months when stored at cold temperature (2-8°C).

Closed vial Stability for Calibrator/Control:

Real time (2-8ºC) stability studies were carried out and are at 204 Days (beyond 6 Months) and results indicate that calibrators/controls are stable when stored at Cold (2-8ºC), up to at least 6 months. Closed vial stability studies will remain on-going.

Summary:

The information provided in this pre-market notification demonstrates that the LZI Oral Fluid Cannabinoid Enzyme Immunoassay (k141320) is substantially equivalent to the legally marketed predicate device for its general intended use. Substantial equivalence was demonstrated through comparison of intended use and physical properties to the commercially available predicate device as confirmed by gas chromatography/mass spectrometry (GC/MS), an independent analytical method. The information supplied in this pre-market notification provides reasonable assurance that the LZI Oral Fluid Cannabinoid Enzyme Immunoassay is safe and effective for its stated intended use.