

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

A. 510(k) Number: K023856

B. Analyte: Methadone

C. Type of Test: Qualitative one-step membrane immunochromatographic test

D. Applicant: Sun Biomedical Laboratories, Inc.

E. Proprietary and Established Names: Visualine® Methadone DipStrip Test

F. Regulatory Information:

1. Regulation section: 21CFR862.3620, Methadone test system.
2. Classification: Class II
3. Product Code: DJR
4. Panel: Toxicology (91)

G. Intended Use:

1. Indication(s) for use: The Visualine®Methadone DipStrip Test is used for qualitative testing for the presence of Methadone in human urine samples at or above 300 ng/ml. This test provides only a preliminary screening result; a more specific alternative method should be used to confirm the test result. The test is for In Vitro Diagnostic use and intended for use by medical professionals.
2. Special condition for use statement(s): The Visualine®Methadone DipStrip Test provides only a preliminary screening result. Gas chromatography/Mass spectrometry is the preferred confirmatory method (1). Clinical considerations and professional judgment should be applied to any drug of abuse analysis, particularly when positive results are indicated. This device is intended for Laboratory Use only and is not intended for Point of Care (POC) use.
3. Special instrument Requirements: None

H. Device Description:

Each VisuaLine® Methadone kit contains 50 treated porous membrane dipstrips. Each dipstrip contains a membrane strip with a defined amount of microspheres coated with polyclonal methadone antibody (rabbit) in buffer solution. A secondary polyclonal antibody (goat-anti-rabbit IgG) is used to form the control line. Although the methadone conjugate to BSA, which is used to form the test line and the goat IgG serum is used to form the control line are absorbed onto the membrane. The entire membrane is then dried

before assembly and is used in the dry form. All necessary reagents for performing the test are pre-formulated and included in each individual test device. No additional reagents are required. One needs only to add the test sample.

I. Substantial Equivalence Information:

1. Predicate device name(s): Hitachi Emit Methadone Assay.
2. Predicate K number(s): K994005
3. Comparison with predicate: Indications for use, operating principle and reagent composition are similar to the predicate device. Differences and similarities are outlined below.

	Hitachi Methadone Assay	Viusaline Methadone DipStrip Test
Test Principle	Homogenous enzyme immunoassay	Competitive binding immunoassay
Sample/Sample Size	200 uL urine	Approx. 150 uL urine
Antibody	Polyclonal	Polyclonal
Tracer	Drug-Glucose-6-Phosphate Dehydrogenase	Ab Colloidal Complex
Detection Method	Change in absorbance (ΔA) value detected spectrophotometrically	Visual color precipitin formation
Test Run Time	10-20 minutes, dependent on test	5 minutes
Storage Requirement	2-8°C (36-46°F)	2-30°C (36-86°F)
Detection Level	300 ng/ml Methadone	300 ng/ml Methadone
Ancillary Equipment	Hitachi Emit Calibrators	None

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

K. Test Principle: The Visualine® Methodone DipStrip Test is a one-step membrane immuno-chromatographic test based on the antigen/antibody complexation, and is used for the analysis of methadone and its metabolite present in the testing of urine samples. The assay is based on the competition between the drug in the test sample and a drug conjugate immobilized on a porous membrane support for the limited antibody sites on colored microspheres. In the absence of a drug in the test sample, the colored microspheres attach to the drug conjugate probe forming a visible line, as the antibody complexes with the drug conjugate. When the drug is present in the urine sample, the drug or drug metabolite competes for the limited antibody sites on the microspheres and will fill the limited antibody binding sites when a sufficient amount of drug is present. This will prevent the attachment of colored microspheres to the probe site on the membrane. Therefore, a positive urine sample will not form a line at the probe area.

A reference or control line with a secondary antibody reaction is also added to the immunochromatographic membrane strip to indicate that the test is viable. This control line should always be present before making any test interpretations. Normally, a negative urine sample will produce two colored lines (the formation of a visible precipitin at the test zone in addition to the control line), and a positive urine sample will show only one line.

L. Performance Characteristics (if/when applicable):

4. Analytical performance:

a. *Precision/Reproducibility:*

Reproducibility was determined over 180 tests using three different lots of Visualine® Methadone DipStrip Test kits during a period of one week. GC/MS was used to establish the Methadone concentration in three control urine samples at 0, 240, and 360 ng/ml. The samples were analyzed in duplicate, twice daily, for a period of five days. The results were compared with the established value for each sample. The data showed >99% precision for all within run, run to run, within day, day to day, within lot, and lot to lot precisions.

b. *Linearity/assay reportable range:* NA

c. *Traceability (controls, calibrators, or method):* NA

d. *Detection limit:* An Analytical Sensitivity Study was conducted to establish the sensitivity parameters of the Visualine® Methadone DipStrip Test. Two different lot numbers of product were used and tested at Methadone concentrations of 0, 150, 200, 240, 300, 360, and 400 ng/ml. The samples for this study were made from Alltech Drug Standards, assayed by GC/MS and diluted in Drug Free Urine. Each concentration was tested on each of the lots, and results read in 5 minutes. The chart below summarizes the results. The Visualine® Methadone has been shown to detect an average of 300 ng/mL for Methadone in urine.

Methadone (ng/ml)	n	# Positives	# Negatives	% Agreement
0	20	0	20	>99
150	20	0	20	>99
200	20	0	20	>99
240	20	0	20	>99
300	20	7	13	65
360	20	20	0	>99
400	20	20	0	>99

e. *Analytical specificity:*

Twenty clinically negative samples were spiked to a concentration of

360 ng/mL of Methadone and tested with the Visualine® Methadone DipStrip Test. The compounds listed in below produced a positive result at initial levels of 100,000 ng/mL. Subsequent dilution were made and tested until a negative test was achieved. The lowest concentration that resulted in a positive test is recorded below.

Interference Substances (compounds detected)

<i>Compound</i>	<i>Concentration (ng/mL)</i>
<i>Methadone</i>	<i>300</i>
<i>dl- Methadone primary metabolite (EDDP)</i>	<i>500,000</i>
<i>Diphenhydramine</i>	<i>100,000</i>
<i>Doxylamine</i>	<i>100,000</i>

For the compound listed below there were no differences in the expectant results at the level tested when tested at 100ug/mL in samples with concentrations of methadone of 0 ng/mL, 250 ng/mL, and 360 ng/mL. Urine samples with a pH between 4.6 and 8.0 showed no interference with specimens in the range of 1.000 to > 1.020.

*Compounds that **do not interfere** with the test*

<i>d-Amphetamine</i>	<i>Indomethicin</i>	<i>Propoxyphene</i>
<i>Benzoylcegonine</i>	<i>Meperidine</i>	<i>Pseudoephedrine</i>
<i>Bromazepam</i>	<i>d-Methamphetamine</i>	<i>Pyridoxine HCL (B-6)</i>
<i>Clobazam</i>	<i>Morphine</i>	<i>Salicylic Acid (asprin)</i>
<i>Dextromethopham</i>	<i>Naltrexone</i>	<i>Secobarbital</i>
<i>Flunitrazepam</i>	<i>Oxazepam</i>	<i>Temazepam</i>
<i>Ibuprofen</i>	<i>Phencyclidine</i>	<i>THC*</i>
<i>Imipramine</i>	<i>Phenmetrazine</i>	<i>l-Tryptophane</i>

* Positive at 30,000 ng/mL

f. *Assay cut-off:* Assay cutoff 300 ng/mL. (See precision/reproducibility section above).

5. Comparison studies:

a. *Method comparison with predicate device:*

The Visualine® Methadone DipStrip Test was compared to a commercially available immunoassay (Hitachi EMIT® II) for methadone at a cutoff of 300 ng/mL and there was >99% agreement of these positive samples and >99% agreement of the negative samples. There were 132 samples in this study. There were 56 positive samples and 76 negative samples analyzed by the Sun Biomedical device. Table I reports the correlation between Methadone samples and the Visualine® Methadone DipStrip Test result.

Table I: Correlation of Candidate with Commercially Marketed Device and with GC/MS (at 300 ng/mL cutoff)

Method		Emit® II Screen		Total Results
		+	-	
Visualine® Methadone DipStrip Test	+	56	0	56
	-	0	76	76
Total results		56	76	132
% Agreement with this commercial kit		100%	100%	100%

New Device	Negative by GC/MS or Predicate	Near Cutoff Negative (-50% cutoff to cutoff)	Near Cutoff Positive (cutoff to +50% cutoff)	GC/MS Positive (> 50% cutoff)	% Agreement with GC/MS
Positive (56)	0	1	7	48	98.2%
Negative (76)	72	4	0	0	100%

b. Matrix comparison: Not applicable. The device is indicated only for urine specimens.

3. Clinical studies:

- a. Clinical sensitivity:* Not applicable. Clinical studies are not typically submitted for this device type.
- b. Clinical specificity:* Not applicable. Clinical studies are not typically submitted for this device type.
- c. Other clinical supportive data (when a and b are not applicable):*

4. Clinical cut-off: Not applicable

5. Expected values/Reference range: Not applicable

M. Conclusion:

Based on the information provided in this submission, I recommend that the Sun Biomedical Laboratories Inc. Visualine® Methadone One-Step, Rapid, Drug Abuse Test Kit is substantially equivalent to the predicate device.