510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY TEMPLATE

A. 510(k) Number:

k093623

B. Purpose for Submission:

Modifications of a cleared device (k061974) which includes the following:

Addition of total bilirubin measurement
Changing the lower end measuring range of the total hemoglobin from 5.0 to 3.0 g/L.
Addition of a new sample size port for sampling 100 µL for total bilirubin and CO-Oximetry mode
Automation of fetal hemoglobin correction for CO-Oximetry

C. Measurand:

Total Bilirubin
Total hemoglobin

D. Type of Test:

Quantitative, Spectrophotometric

E. Applicant:

Instrumentation Laboratory Co.

F. Proprietary and Established Names:

GEM® Premier 4000 with iQM® (Intelligent Quality Management)
GEM CVP 2 (Calibration Valuation Product) with CO-Ox
GEM CVP 5 with tBili (Calibration Valuation Product)
GEM System Evaluator
GEM Hematocrit Evaluator

G. Regulatory Information:

1. Regulation section:

Product Code	Classification	Regulation Section	Panel
CIG – Total Bilirubin Test System	Class II	21 CFR § 862.1110	75-Chemistry
MQM – Bilirubin in the Neonate Test System	Class I, reserved	21 CFR § 862.1113	75-Chemistry
JJY – Quality Control Material (Assayed and Unassayed)	Class I, reserved	21 CFR § 862.1660	75-Chemistry
GLK – Hematocrit Control	Class II	21 CFR § 864.8625	81-Hematology

H. Intended Use:

1. Intended use(s):

   See Indications for use below.

2. Indication(s) for use:

   The GEM Premier 4000 with iQM is a portable critical care system for use by healthcare professionals to rapidly analyze whole blood samples at the point of health care delivery in a clinical setting and in a central laboratory. The instrument provides quantitative measurements of pH, pCO2, pO2, Na+, K+, CL^-, Ca++, glucose, lactate, hematocrit, total bilirubin, and CO-Oximetry (tHb, O2Hb, COHb, MetHb, HHb) parameters. These parameters, along with derived parameters, aid in the diagnosis of a patient's acid/base status, electrolyte and metabolite balance and oxygen delivery capacity. Total bilirubin measurements are used in the diagnosis and management of biliary tract obstructions, liver disease and various hemolytic diseases and disorders involving the metabolism of bilirubin. In neonates, the level of total bilirubin is used to aid in assessing the risk of kernicterus.

   Intelligent Quality Management (iQM) is used as the quality control and assessment system for the GEM Premier 4000 system. iQM is an active quality process control program designed to provide continuous monitoring of the analytical process with real-time, automatic error detection, automatic correction of the system and automatic documentation of all corrective actions, replacing the use of traditional external quality controls. Facilities should follow local, state and federal regulatory guidelines to ensure that a total quality management system is followed.

   As part of this program, GEM CVP (Calibration Valuation Product) *with* CO-Ox, GEM CVP tBili and GEM CVP Hematocrit are external solutions intended to complete the calibration process and final accuracy assessment of the iQM cartridge calibration after initial warm-up. The reported values for GEM CVP (two levels for pH, blood gases, electrolytes, metabolites, total bilirubin, CO-Oximetry and hematocrit) must meet IL's specifications before the iQM cartridge can be used for patient sample measurements.

Once the cartridge calibration is verified, the internal iQM program monitors the status of the system during the cartridge use life.

GEM System Evaluator is a three level assayed quality control material intended for evaluating performance characteristics of pH, *p*CO2, *p*O2, electrolytes, metabolites, total Bilirubin (tBili) and CO-Oximetry on the GEM Premier 4000 analyzer.

GEM Hematocrit Evaluator is a three-level assayed quality control material intended for evaluating performance characteristics of hematocrit on the GEM Premier 4000 analyzer.

3. Special conditions for use statement(s):

   For Prescription use only.
   At point-of-care or central laboratory settings.

4. Special instrument requirements:

   GEM Premier 4000 analyzer

I. Device Description:

Addition of total bilirubin (tBili) measurement with whole blood and heparinized plasma on the GEM Premier 4000 performed using spectrophotometric multi-component analysis through the instrument's existing CO-Oximetry module. Following the electrochemical measurements for blood gases, electrolytes and metabolites, a portion of the sample is chemically hemolyzed and brought into an optical cell for the CO-Oximetry measurements and the additional total bilirubin measurement. There was no hardware or mechanical changes required, and no changes to the reagent cartridge (PAK) formulation or sensors. The measurement of total bilirubin was implemented through software.

GEM CVP 2 with CO-Ox: Comes in a liquid, ready to use sealed ampoule, contains 1.8 mL of solution. Solution contains aqueous buffered bicarbonate solution containing inorganic salts and organic metabolites, stabilizer, surfactant, dye and biocides; equilibrated with precise concentrations of carbon dioxide and oxygen.

GEM CVP 5 tBili: Comes in a liquid, ready to use sealed ampoule, contains 1.8 mL of solution. Solution contains purified human hemoglobin, stabilizers and biocide in a physiologically buffered matrix.

GEM System Evaluator: Three-level aqueous (Level 1, 2, and 3) buffered bicarbonate solution intended for use with the GEM Premier 4000 analyzer, containing inorganic salts and organic metabolites, dye and biocides; equilibrated with carbon dioxide and oxygen. Each ampoule contains 1.8 mL of solution.

GEM Hematocrit Evaluator: Three-level aqueous (Level 1, 2, and 3) buffered bicarbonate solution intended for use with the GEM Premier 4000 analyzer, containing inorganic salts and biocides; equilibrated with carbon dioxide and oxygen. Each ampoule contains 1.8 mL of solution.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   GEM Premier 4000 with iQM and CVP
   ABL 735 Analyzer
   Quantimetrix Bilirubin Control

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

   k061974
   k991417
   k860942

3. Comparison with predicate:

Category	**ABL 735 analyzer (k991417) Predicate device**	**GEM Premier 4000 with Total Bilirubin (tBili) Candidate device**
Indications for Use	The ABL is intended for in vitro testing of whole blood samples for pH, *p*CO2, *p*O2, sodium, potassium, chloride, calcium, glucose, lactate, total bilirubin, hematocrit and CO-Oximetry (tHb, O2Hb, COHb, MetHb, HHb) parameters. These parameters, along with derived parameters, aid in the diagnosis of a patient's acid/base status, electrolyte and metabolite balance oxygen delivery capacity.	Same
Sample Type	Whole blood and heparinized plasma	Same
Test principle	Spectrophotometry	Same

Category	**GEM CVP 2 *with* CO-Ox (k061974) Predicate device**	**GEM CVP 2 *with* CO-Ox– Candidate device**
Indications for Use	External Calibration Valuation Product used to complete the calibration process of the analyzers prior to use with patient samples.	Same

Formulation	Aqueous buffered bicarbonate solution containing inorganic salts and organic metabolites, stabilizer, dye and biocides; equilibrated with precise concentrations of carbon dioxide and oxygen	Same
Storage	Unopened ampules are stable until the expiration date shown on the label when stored at 2-8°C, or up to 8 months at room temperature (15-25°C), providing storage does not exceed the expiration date. DO NOT FREEZE.	Same

Category	**Quantimetrix QC Bilirubin (K860942) Predicate device**	**GEM CVP 5 tBili – Candidate device**
Indications for Use	Intended as a means of monitoring various bilirubin assay methods to validate quantitation of patient samples.	Same
Formulation	Prepared from purified bilirubin in a human protein base. Stabilizers and preservatives have been added.	Same
Storage	Store at 2-8°C	Same

Category	**GEM CVP 1 and 2 *with* CO-Ox (K061974) Predicate device**	**GEM System Evaluator-Candidate device**
Indications for Use	Intended to be used to complete the calibration process of the GEM Premier 3000 and GEM Premier 4000 analyzers prior to use with patient samples.	Same
Formulation	Aqueous buffered bicarbonate solution	Same
Storage	2-8°C until expiration 15-25°C for 8 months	2-8°C until expiration 15-25°C for 4 months

Category	**GEM CVP 3 and 4 Hematocrit (K061974) Predicate device**	**GEM Hematocrit Evaluator – Candidate device**
Indications for Use	Intended to be used to complete the calibration process of the GEM Premier 3000 and GEM Premier 4000 analyzers prior to use with patient samples.	Same
Formulation	Aqueous buffered bicarbonate solution	Same
Storage	15-25°C until expiration	Same

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

None referenced

L. Test Principle:

Total bilirubin (tBili) measurement with whole blood and heparinized plasma is performed using spectrophotometric multi-component analysis through the instrument's existing CO-Oximetry module. Following the electrochemical measurements for blood gases, electrolytes and metabolites, a portion of the sample is chemically hemolyzed and brought into an optical cell for the measurements.

The automated fetal hemoglobin (HbF) feature consisted of adding fetal-OxyHb (O2HbF) as a factor to the existing multivariate analysis of O2Hb, COHb, HHb, turbidity and scatter performed for CO-Oximetry analytes. This addition of the O2HbF spectra to the existing multivariate analysis directly accounted for O2HbF impact without requiring an additional compensation step by manual entry.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

All the performance characteristics were performed using the GEM Premier 4000 analyzer.

a. Precision/Reproducibility:

i.) A precision study was performed to verify the performance of the GEM Premier 4000 analyzer with the new total bilirubin parameter and the extended range for total hemoglobin parameter. Precision testing was performed in-house on 5 different analyzers. Blood samples were collected from healthy adult volunteer into heparinized tubes to generate whole blood and plasma samples for the precision evaluations. Samples were altered with various levels of analytes to span the claimed measuring ranges. Additional precision testing with tBili for 3 whole blood samples prepared each day at low levels (0.5, 1.0, and 2.5 mg/dL) were evaluated in replicates of 10, twice a day for 5 consecutive days on 3 GEM 4000 analyzer. Within-run imprecisions with SD and %CV are shown in the tables below:

Precision for total hemoglobin

Total N per Level	Mean (g/dL)	SD (g/dL)	Within-run %CV
45	3.3	0.0	0.0
15	7.0	0.0	0.3
421	14.3	0.1	0.8

69	15.2	0.1	0.8
15	20.6	0.1	0.4

Whole blood precision for total bilirubin*

Total N per level	Mean (mg/dL)	SD (mg/dL)	Within-run % CV
30*	0.5	0.08	15.6
30*	1.4	0.09	6.6
30*	2.4	0.09	3.8
90	5.4	0.19	3.4
90	10.1	0.18	1.8
85	14.5	0.26	1.8
90	19.2	0.31	1.6

* For whole blood precision, samples spiked at 0.5, 1.4 and 2.5 mg/dL were assayed on 3 analyzers, 10 replicated per analyzer.

Heparinized plasma precision for total bilirubin

Total N per level	Mean (mg/dL)	SD (mg/dL)	Within-run % CV
15	0.8	0.03	3.75
15	5.6	0.04	0.69
15	9.3	0.05	0.54
15	14.2	0.06	0.39
15	21.2	0.08	0.39
15	29.4	0.09	0.30
15	38.6	0.23	0.60

ii) A precision study was performed for total bilirubin (tBili) using GEM CVP 2 *with* CO-Ox and GEM CVP 5 tBili for total bilirubin. The CVP levels were assayed twice a day in duplicate over 10 days on 3 different GEM Premier 4000 instruments (N=120 per CVP level).

tBili	**Mean (mg/dL)**	**Day-to-Day % CV**	**Total %CV**
CVP Level 2	25.11	0.5%	0.6%
CVP Level 5	4.9	2.2%	2.3%

iii) A precision study was performed to evaluate the performance of the new GEM System Evaluator on the GEM Premier 4000. The three control levels were assayed

twice a day in duplicate over 20 days on a GEM Premier 4000 instrument (N=80 per level).

GEM System Evaluator	Parameter	Mean	Day-to-Day % CV (SD)	Total % CV (SD)
Level 1	pH	7.131	0.6/(0.003)	1.1/(0.006)
	pCO_2 (mmHg)	88.6	1.8	5.0
	pO_2 (mmHg)	35.1	3.4	11.4
	Na^+ (mmol/L)	122.7	0.2	0.4
	K^+ (mmol/L)	2.40	0.0	0.5
	Ca^{++} (mmol/L)	1.531	0.2	0.6
	Cl (mmol/L)	84.2	0.4	0.6
	Glucose (mg/dL)	359.1	0.8	1.3
	Lactate (mmol/L)	6.75	0.5	1.7
	tBili (mg/dL)	33.37	0.0	0.8
	tHb (g/dL)	20.37	0.0	1.4
	O_2Hb (%)	37.29	0/(0.00)	0.1/(0.04)
	COHb (%)	31.86	0/(0.00)	0.2/(0.05)
	MetHb (%)	8.19	0/(0.00)	0.8/(0.06)
	HHb (%)	22.69	0/(0.00)	0.3/(0.06)

GEM System Evaluator	Parameter	Mean	Day-to-Day % CV (SD)	Total % CV (SD)
Level 2	pH	7.384	0.04/(0.0003)	0.8/(0.006)
	pCO_2 (mmHg)	34.0	0.2	3.2
	pO_2 (mmHg)	88.8	0.0	5.1
	Na^+ (mmol/L)	138.8	0.0	0.4
	K^+ (mmol/L)	4.495	0.1	0.5
	Ca^{++} (mmol/L)	1.169	0.0	0.6
	Cl (mmol/L)	106.6	0.2	0.7
	Glucose (mg/dL)	100.8	0.6	1.6
	Lactate (mmol/L)	0.79	0.01	7.3

	tBili (mg/dL)	17.42	0.0	0.9
	tHb (g/dL)	14.32	0.0	1.1
	O_2Hb (%)	73.70	0/(0.00)	0.01 (0.01)
	COHb (%)	16.90	0/(0.00)	0.1 (0.01)
	MetHb (%)	2.42	0/(0.00)	2.2 (0.05)
	HHb (%)	6.98	0/(0.00)	0.8 (0.06)

GEM System Evaluator	**Parameter**	**Mean**	**Day-to-Day % CV (SD)**	**Total % CV (SD)**
Level 3	pH	7.572	0.2/(0.001)	0.8/(0.005)
	pCO_2 (mmHg)	14.0	0.9	4.3
	pO_2 (mmHg)	354	2.5	4.2
	Na^+ (mmol/L)	155.3	0.1	0.4
	K^+ (mmol/L)	7.39	0.4	0.7
	Ca^{++} (mmol/L)	0.701	0.4	0.8
	Cl (mmol/L)	140.7	0.2	0.6
	Glucose (mg/dL)	40.6	0.8	3.2
	Lactate (mmol/L)	2.35	0.01	2.6
	tBili (mg/dL)	2.95	0.009	2.8
	tHb (g/dL)	7.45	0.009	1.1
	O_2Hb (%)	92.90	0.003 (0.003)	1.1 (0.02)
	COHb (%)	3.40	0.03(0.0009)	0.02 (0.02)
	MetHb (%)	0.16	0.0 (0.0)	31 (0.05)
	HHb (%)	3.55	0.01 (0.05)	1.4 (0.05)

iv) A precision study was performed to evaluate the performance of the new GEM Hematocrit Evaluator on the GEM Premier 4000. The three control levels were assayed twice a day in duplicate over 20 days on a GEM Premier 4000 instrument (N=80 per level).

GEM System Hematocrit	Mean (%)	Day-to-Day % CV	Total %CV
Level 1	21.91	0.1	0.3
Level 2	42.14	0.2	0.2
Level 3	67.00	0.1	0.1

b. Linearity/assay reportable range:

i) Linearity for total bilirubin measurement:

A linearity study was performed by using whole blood samples spiked with synthetic total bilirubin (NIST, SRM 916a). Blood samples containing different levels of total bilirubin were tested in triplicate on three different GEM Premier 4000 analyzers. The measured values were plotted against the expected values and an appropriate line fitted by standard linear regression was performed. Eight samples range from 0.0 to 40 mg/dL (0, 5, 10, 15, 20, 30, 40 mg/dL) were tested. The linear equation generated is Y=1.0517X - 0.0541 with regression coefficient (R^2) of 0.9999.

In addition, a linearity study was performed by using heparinized plasma samples using protocol similar to the whole blood bilirubin linearity study performed above. Eight samples range from 0.0 to 40 mg/dL (0, 5, 10, 15, 20, 30, 40 mg/dL) were tested. The linear equation generated is Y=1.0183X + 0.0385 with regression coefficient (R2) of 0.9989.

The results of the linearity study and detection limits study support the sponsor's claimed that the total bilirubin assay is linear from 0.3 to 40 mg/dL for both whole blood samples and heparinized plasma samples.

ii) Linearity for total hemoglobin measurement:

A linearity study was performed by using whole blood samples collected from a healthy donor. The whole blood samples were pooled and the plasma red blood cell ratio was modified to prepare a stock solution containing 25.5 g/dL total hemoglobin. Different tHb levels were then prepared by serial diluting the stock solution with a 50/50 of plasma and heparinized plasmalyte. Seven samples containing different levels of tHb were tested in triplicate on four different GEM Premier 4000 analyzers. The measured values were plotted against the expected values and an appropriate line fitted by standard linear regression was performed. Seven samples range from 2 to 25.5 g/dL (2, 3, 5, 10, 15, 20, 25.5 mg/dL) were tested. The linear equation generated is Y=0.9697X + 0.2561 with regression coefficient (R^2) of 0.9997.

The results of the linearity study support the sponsor's claimed that the total bilirubin assay is linear from 3 to 23 g/dL.

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

Total Bilirubin method is traceable to the NIST #916 reference materials, based on the modified Jendrassik-Grof method.

Stability:

GEM CVP 2 *with* CO-Ox and GEM CVP 5 tBili are the same materials as previously cleared CVP materials in k061974 and k861901.

GEM System Evaluator: Shelf-life stability was evaluated using real-time stability studies and is still on-going. Protocols and acceptance criteria has been provided and found to be acceptable. Unopened ampoules are stable until the expiration date shown on the label when stored at 2-8^{o}C and stable up to 4 months when stored at room temperature (15-25^{o}C).

GEM System Hematocrit Evaluator: Shelf-life stability was evaluated using real-time stability studies and is still on-going. Protocols and acceptance criteria has been provided and found to be acceptable. Unopened ampoules are stable until the expiration date shown on the label when stored at 15-25 ^{o}C.

d. Detection limit:

The functional sensitivity was defined as the lowest concentration of an analyte at which quantitative information is available and when a CV of ≤ 20% is obtained. A whole blood sample contains low levels of total bilirubin and hemoglobin was tested in 10 replicates on 5 different GEM Premier 4000 analyzers. The sponsor determined that the functional sensitivity of total bilirubin is 0.3 mg/dL and 3.0 g/dL for total hemoglobin.

The claimed measuring range of the total bilirubin test is 0.3 to 40 mg/dL and the claimed measuring range of the total hemoglobin is 3.0 to 23 g/dL.

e. Analytical specificity:

An interference study was performed to evaluate the substances that may have potential to interfere with the total bilirubin measurement. The following substances were tested on the GEM Premier 4000 analyzer with the concentrations of the interferents listed. Blood samples were first spiked with pooled clinical plasma (containing high bilirubin levels) prior to spiking the interfering substances. One level of bilirubin concentration was tested (10 mg/dL), except for Fetal hemoglobin

(tbili. tested at 5.0, 10.0 and 18.6 mg/dL). Interference testing was performed in duplicate on multiple GEM Premier 4000 instruments. For fetal hemoglobin: Pooled cord blood samples were used. Since these samples have different total hemoglobin and total bilirubin levels, interference was assessed based on the deviation from the predicate device (Radiometer ABL 735). The sponsor defined non-significant interference as ± 0.4 mg/dL or < 10% difference between the spiked samples and the un-spiked samples (between candidate device and predicate device for fetal Hb). Based on the data, the sponsor claims no significant interference for the substances and concentrations listed in the table below:

Substance	Concentration tested
Fetal hemoglobin	Up to 80% Hbg F

The following substances have been found to be interfering substances and the sponsor has listed them in the labeling.

Substance	Concentration tested
Biliverdin	4 mg/dL
Cyanmethemoglobin	4%
Cyanocobalamin	0.75 g/L
Hydroxocobalamin	0.75 g/L
Methylene Blue (immediately after spiking)	20 mg/L
Methylene Blue (immediately after 15 minutes of spiking)	20 mg/L
Methylene Blue (immediately after 1 hour of spiking)	20 mg/L
Methemoglobin	10%
Sulfhemoglobin	10%
Turbidity	10% based on turbidity created by Intralipid emulsion (10%)
Indocyanine green	10 mg/L
Evans Blue	10 mg/dL

f. Assay cut-off:

Not applicable

2. Comparison studies:

a. Method comparison with predicate device:

i) The sponsor performed method comparison studies at three external clinical sites: 1 point of care sites and 2 central laboratory sites. The point of care site is a neonatal intensive care unit in a hospital. Results of these studies are summarized below.

Point of care site:

Testing included 229 neonatal samples tested on the candidate device and the Vitros 250 chemistry analyzer (k922072).

Analyte	N	Slope	Intercept	R^2	Sample Range
tBili	229	1.0329	-0.2302	0.9674	0.3 – 21.1 mg/dL

Laboratory site 1:

Testing included 95 adults and 93 neonatal samples tested on the candidate device and the Radiometer ABL 835 (k041874).

Analyte	N	Slope	Intercept	R^2	Sample Range
tBili	188	1.0163	-0.2715	0.991	0.3 – 38.1 mg/dL

Laboratory site 2:

Testing included 33 adults and 22 neonatal samples tested on the candidate device and the Beckman CX4 analyzer (k011465).

Analyte	N	Slope	Intercept	R^2	Sample Range
tBili	54	0.9600	0.1972	0.9604	0.3 – 27.5 mg/dL

Additional testing including 36 plasma samples tested on the candidate device and the Beckman DxC 800 analyzer was performed.

Analyte	N	Slope	Intercept	R^2	Sample Range
tBili	36	0.9245	-0.0519	0.9827	0.4 – 22.3 mg/dL

ii) Additional method comparison study was performed to demonstrate that the 100 µL sample port obtained equivalent results as the original 150 µL sample port. Testing was performed using whole blood samples collected from a healthy donor using heparinized tubes. Whole blood samples were modified to different levels of Hb and tested in triplicate on 3 to 4 different GEM 4000 analyzers. The CO-Oximetry parameters (analytes) obtained from 100 µL sample port was as follow: O2Hb, COHb, tHb, Met Hb, and HHb. Linear regressions were calculated for the 100 µL sample port against the 150 µL sample port. Results are summarized below:

Analyte	Slope	Intercept	R2	Sample range
O2Hb, %	0.9872	1.2104	0.9997	4-97%
COHb, %	0.9982	-0.0055	0.9998	2-50%
tHb, g/dL	1.0124	-0.118	0.9996	3-23 g/dL
MetHb, %	0.9919	0.0358	0.9996	1-25%
HHb, %	0.9875	-0.1741	0.9998	0.5-95%

b. Matrix comparison:

See M.2.a. above for plasma method comparison study to demonstrate that heparinized plasma is an acceptable anticoagulant to use.

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):

Automation of fetal hemoglobin correction for CO-Oximetry: The new software applies the correction automatically based on the presence of fetal hemoglobin in the sample without user input. This is a new feature and method comparison studies using neonates had demonstrated that this feature is working properly (see M.2.a. above). In addition, the impact of auto-HbF correction was assessed by comparing the results of samples ranging from 0 – 85% HbF (674 adult donors + 235 cord blood samples obtained through a commercial vendor). Samples were tested on five GEM analyzers and the results compared to an IL 682 CO-Oximeter with fetal Hb correction mode. The linear regression generated a slope of 0.9312 and a R^2 of 0.9546.

CO-Oximetry measurements using 100 µL sample port was performed to verify the precision of the CO-Oximetry parameters/analytes against the original 150 µL sample port (normal sampling) Each day, two whole blood sample preparations (Level 1 and Level 2) were tested in triplicate twice per day in each sample modes for 5 days on each of five different GEM 4000 analyzers for a total of 30 samples per instrument and a pooled total of N=150 per level. With-run pooled variance of the 100 µL sample port is within the sponsor's acceptance criteria and all results (<1.0 SD) are very similar to the original 150 µL sample port.

4. Clinical cut-off**:**

   Not applicable

5. Expected values/Reference range:

   Expected values for serum total bilirubin*:

   Premature Infants:
   ≤ 1 day < 8.0 mg/dL
   1–2 days < 12.0 mg/dL
   3–5 days < 16.0 mg/dL

   Full Term Infants
   ≤ 1 day: 1.4 – 8.7 mg/dL
   1–2 days: 3.4 – 11.5 mg/dL
   3–5 days: 1.5 – 12.0 mg/dL

   >5 days to < 60 years old: 0.3-1.2 mg/dL
   60 years to 90 years old: 0.2-1.1 mg/dL
   > 90 years old: 0.2 – 0.9 mg/dL

   *Wu, A., Tietz Clinical Guide to Laboratory Tests. W. B. Saunders Co., St. Louis, MO, Fourth Edition: 2006.

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.