November 6, 2019

PerkinElmer Inc.
Brian Ciccariello
Head of Regulatory & Medical Affairs - Americas
940 Winter Street
Waltham, MA 02451

Re: K190335
Trade/Device Name: GSP Neonatal Total Galactose kit
Regulation Number: 21 CFR 862.1310
Regulation Name: Galactose test system
Regulatory Class: Class I, Reserved
Product Code: JIA
Dated: September 27, 2019
Received: September 30, 2019

Dear Brian Ciccariello:

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. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. 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 Part

801 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

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 https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Marianela Perez-Torres, M.T., Ph.D.
Acting Deputy Director
Division of Chemistry and Toxicology Devices
OHT7: Office of In Vitro Diagnostics
and Radiological Health
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K190335

Device Name
GSP Neonatal Total Galactose kit

Indications for Use *(Describe)*
The GSP Neonatal Total Galactose kit is intended for the quantitative determination of total galactose (galactose and galactose-1-phosphate) concentrations in blood specimens dried on filter paper as an aid in screening newborns for galactosemia using the GSP® instrument.

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

This 510(k) Summary information is supplied in accordance with the requirements of SMDA 1990 and 21 CFR 807.92.

The assigned 510(k) number is K190335.

Date: November 5, 2019

Submitted by: PerkinElmer Inc.
940 Winter Street
Waltham, MA 02451

Contact Person: Brian Ciccariello
Head of Regulatory & Medical Affairs - Americas
Email: brian.ciccariello@perkinelmer.com
Phone: 781-663-5651

Trade Name: GSP Neonatal Total Galactose kit

Common Name: Galactose test System

Regulation: 21 CFR 862.1310

Classification Name: Galactose test System

Classification: I, Reserved

Panel: 75 Clinical Chemistry

Product Code: JIA

Predicate Device: GSP Neonatal Total Galactose kit [K133652]

Device Description:

The GSP Neonatal Total Galactose test system measures total galactose, i.e. both galactose and galactose-1-phosphate, using a fluorescent galactose oxidase method. The fluorescence is measured using an excitation wavelength of 505 nm and an emission wavelength of 580 nm. The GSP Neonatal Total Galactose kit contains sufficient reagents to perform 1152 assays.

The kit contains the following components:

Calibrators have been prepared from human red blood cells enriched with galactose, and with ProClin 300 as preservative. The hematocrit value is 50 - 55 % to correspond to a hematocrit of a newborn. The calibrators have been calibrated against primary calibrators gravimetrically prepared using a U.S. Pharmacopeia Reference Standard Preparation for galactose.

Controls have been prepared from human blood enriched with galactose and galactose-1-phosphate, and with ProClin 300 as preservative. Prior to dispensing the blood onto the filter paper, the hematocrit value of blood used in the controls preparation is adjusted to 50 - 55 % to correspond to a hematocrit of a newborn. The low control is approximately 4.0 mg/dL and the high control approximately 12 mg/dL.

All human source materials used in the preparation of kit components were tested and found to be non-reactive for the presence of HBsAg, anti-HIV 1 and 2, and HCV by FDA approved methods.

Neonatal Total Galactose Assay Reagent 1 – 3 lyophilized vials
Neonatal Total Galactose Assay Reagent 2 – 3 lyophilized vials
Neonatal Total Galactose Assay Buffer – 3 bottles, 40 ml
Neonatal Total Galactose Assay Reconstitution Solution – 1 bottle, 20 ml
Neonatal Extraction Solution – 2 bottles, 60 ml

Intended Use:
The GSP Neonatal Total Galactose kit is intended for the quantitative determination of total galactose (galactose and galactose-1-phosphate) concentrations in blood specimens dried on filter paper as an aid in screening newborns for galactosemia using the GSP® instrument.

Comparison Chart:
Comparison of the GSP Neonatal Total Galactose device with its predicate:

GSP Neonatal Total Galactose kit		
Characteristics	**Proposed Device**	**Predicate Device (K133652)**
Intended Use/Indications for Use	The GSP Neonatal Total Galactose kit is intended for the quantitative determination of total galactose (galactose and galactose-1-phosphate) concentrations in blood specimens dried on filter paper as an aid in screening newborns for galactosemia using the GSP® instrument.	Same

Test Methodology	Enzymatic assay	Same
Detection Method	Fluorescence – measured at 505 nm and 580 nm wavelengths	Same
Instrument Platform	GSP instrument, automated (K090846)	Same
Sample Type	Dried blood spot	Same
Reportable Range	1.2 - 50 mg/dL	1.15 – 50 mg/dL
Lower Limits of Measure	LoB = 0.3 mg/dL LoD = 0.7 mg/dL LoQ = 1.2 mg/dL	LoB = 0.34 mg/dL LoD = 0.97 mg/dL LoQ = 1.15 mg/dL
Calibrators	A - 0.5 mg/dL B - 2.5 mg/dL C - 5.0 mg/dL D - 10 mg/dL E - 20 mg/dL F - 50 mg/dL	A – 0.5 mg/dL B – 2.5 mg/dL C – 5.0 mg/dL D – 10.0 mg/dL E – 20 mg/dL F – 50 mg/dL
Part Number	3309-002U	3309-001U

Summary of Non-Clinical Studies:

The variation of the 3309-002U GSP Neonatal Total Galactose assay was determined in three different studies using dried blood spot samples. The repeatability (within-plate variation) and within-laboratory variation were determined with 40 plates (2 sample replicates/plate) of a single kit lot measured over 20 working days with a single GSP instrument (80 results/sample). The between-instrument variation was determined with 15 plates (5 sample replicates/plate) of a single kit lot measured over 5 working days with three GSP instruments (75 results/sample). The between-lot variation was determined with 15 plates (5 sample replicates/plate) of three kit lots measured over 5 working days with a single GSP instrument (75 results/sample). Total variation ranged from 10.0 to 13.9 %CV.

The Limit of Blank (LoB) for total galactose is 0.3 mg/dL (17 µmol/L), defined as the 95th percentile of a distribution of blank samples (n = 150). The Limit of Detection (LoD) is 0.7 mg/dL (39 µmol/L) based on 60 determinations of 6 low level samples. The Limit of Quantitation (LoQ) is 1.2 mg/dL (67 µmol/L), defined as the lowest concentration with a total CV equal to or less than 20 %.

For total galactose, the method has been demonstrated to be linear throughout the measuring range (from 1.2 mg/dL (67 µmol/L) to 50 mg/dL (2775 µmol/L)).

The recovery of galactose, galactose-1-phosphate, and both combined was determined from three contrived dried blood spot samples with an average recovery of 98%, 115% and 102% respectively.

The potentially interfering substances were added to whole blood with three total galactose concentrations (5, 10, and 15 mg/dL). The substances indicated in the table below were found not to interfere with the assay. A bias exceeding ±15% is considered a significant interference.

Total Galactose conc. (mg/dL)	Acetaminophen concentration tested mg/dL	Percent change in measured galactose (%)	Significant change
5	1.38	-6.7	No
	2.75	-13.5	No
	4.13	-23.7	Yes
	5.5	-24.3	Yes
10	1.38	-9.8	No
	2.75	-16.3	Yes
	4.13	-20.3	Yes
	5.5	-22.0	Yes
15	1.38	-10.3	No
	2.75	-18.5	Yes
	4.13	-25.9	Yes
	5.5	-29.5	Yes

Total Galactose conc. (mg/dL)	Conjugated bilirubin concentration tested mg/dL	Percent change in measured galactose (%)	Significant change
5	8.3	-7.8	No
	16.6	-44.8	Yes
	24.9	-90.5	Yes
	33.2	-93.7	Yes
10	8.3	-5.0	No
	16.6	-13.9	No
	24.9	-38.2	Yes
	33.2	-84.5	Yes
15	8.3	-1.4	No
	16.6	-8.0	No
	24.9	-24.5	Yes
	33.2	-75.4	Yes

Intralipid was found not to interfere up to added concentrations of 125 mg/dL at 5 mg/dL total galactose, up to 375 mg/dL at 10 mg/dL total galactose, and up to 500 mg/dL at 15 mg/dL total galactose. When present above these amounts Intralipid may cause a false positive screening result for a sample with measured total galactose concentration close to the cut-off value.

Total Galactose conc. (mg/dL)	Intralipid concentration tested mg/dL	Percent change in measured galactose (%)	Significant change
5	125	1.1	No
	250	21.1	Yes
	375	29.7	Yes
	500	40.8	Yes
	750	58.2	Yes
	1130	97.1	Yes
	1500	126.0	Yes
10	125	6.2	No
	250	9.4	No
	375	11.8	No
	500	22.0	Yes
	750	40.2	Yes
	1130	53.0	Yes
	1500	67.6	Yes
15	125	-4.3	No
	250	0.7	No
	375	8.7	No
	500	8.2	No
	750	22.3	Yes
	1130	37.2	Yes
	1500	50.2	Yes

In addition, hemoglobin in combination with elevated bilirubin concentration of 15 mg/dL was found to interfere with the assay by increasing the measured total galactose concentration (see the table below). Therefore, hemoglobin level at 237 g/L and above in combination with elevated bilirubin level may cause a false positive screening result for a sample with measured total galactose concentration close to the cut-off value.

Total Galactose conc. (mg/dL)	Hemoglobin concentration tested g/L at bilirubin level 15 mg/dL	Percent change in measured galactose (%)	Significant change
5	103	-11.7	No
	204	10.3	No
	223	7.1	No
	237	17.6	Yes
10	103	-5.9	No
	204	14.2	No
	223	12.1	No
	237	17.6	Yes
15	103	-12.3	No
	204	6.9	No
	223	12.0	No
	237	13.2	No

Hematocrit levels from 35% to 65% (Hemoglobin levels 12–22 g/dL, i.e. 120–220 g/L) were found not to interfere at total galactose concentrations of 5, 10, and 15 mg/dL.

Hook Effect:

No hook effect has been found with total galactose concentrations up to 500 mg/dL (27750 µmol/L)

Summary of Method Comparison:

The 3309-002U GSP Neonatal Total Galactose kit (y) was compared with the 3029-0010 Neonatal Total Galactose kit (x) using routine newborn screening dried blood spot samples and dried adult human whole blood samples spiked with galactose and galactose-1-phosphate in the range of 1.2–50 mg/dL (67–2775 µmol/L) when determined with the 3309-002U GSP Neonatal Total Galactose kit. The correlation from weighted Deming regression was found to be:

mg/dL: y= 1.05x - 0.29; 95% CI: slope (0.97; 1.12), intercept (-0.48; -0.10) (n=139)
µmol/L: y= 1.05x - 16; 95% CI: slope (0.97; 1.12), intercept (-27; -6) (n=139)

The 3309-002U GSP Neonatal Total Galactose kit (y) was compared with the 3309-001U GSP Neonatal Total Galactose kit (x) using routine newborn screening dried blood spot samples in the range of 1.2–50 mg/dL (67–2775 µmol/L) when determined with the 3309-002U GSP Neonatal Total Galactose kit. The correlation from Deming regression was found to be:

mg/dL: y = 1.00x + 0.33; 95% CI: slope (0.96; 1.04), intercept (0.25; 0.42) (n=545)
µmol/L: y = 1.00x + 18.6; 95% CI: slope (0.96; 1.04), intercept (13.7; 23.4) (n=545)

Summary of screening performance study:

In a study conducted at one newborn screening laboratory in the United States, the screening performance of the new and predicate device was evaluated with a total of 2161 samples (7 confirmed positive samples and 2154 routine samples). The screening performance is shown below based on 95th and 99th percentile values.

Screening performance of GSP Neonatal Total Galactose test system (95th percentile)

		3309-001U		
		Screening positive ≥ 3.9 mg/dL	**Screening negative < 3.9 mg/dL**	**Total**
3309-002U	**Screening positive ≥ 4.1 mg/dL**	100*	14	114
	Screening negative < 4.1 mg/dL	14	2033**	2047
	Total	114	2047	2161

* Includes 5 retrospective galactosemia diagnosed screening samples.
** Includes 1 retrospective galactosemia diagnosed screening sample that was collected 22 hours after birth. . According to CLSI guideline [5], for laboratories measuring galactose it may be necessary to wait at least 24 hours of milk intake to transpire to minimize false-negative results.
** Includes 1 Duarte variant sample, see Limitations of the Procedure for details.

Overall percent agreement = 98.7 % (95%CI 98.1 % – 99.1 %)
Positive percent agreement = 87.7 % (95%CI 80.3 % – 93.1 %)
Negative percent agreement = 99.3 % (95%CI 98.9 % – 99.6 %)

Screening performance of GSP Neonatal Total Galactose test system (99th percentile)

		3309-001U		
		Screening positive ≥ 7.0 mg/dL	**Screening negative < 7.0 mg/dL**	**Total**
3309-002U	**Screening positive ≥ 6.8 mg/dL**	20*	7	27
	Screening negative < 6.8 mg/dL	7***	2127**	2134
	Total	27	2134	2161

* Includes 4 retrospective galactosemia diagnosed screening samples.
** Includes 1 retrospective galactosemia diagnosed screening sample that was collected 22 hours after birth. . According to CLSI guideline [5], for laboratories measuring galactose it may be necessary to wait at least 24 hours of milk intake to transpire to minimize false-negative results.
** Includes 1 Duarte variant sample, see Limitations of the Procedure for details.
*** Includes 1 retrospective galactosemia diagnosed screening sample that was collected 16 hours after birth. According to CLSI guideline [5], for laboratories measuring galactose it may be necessary to wait at least 24 hours of milk intake to transpire to minimize false-negative results.

Overall percent agreement = 99.4 % (95%CI 98.9 % – 99.6 %)
Positive percent agreement = 74.1 % (95%CI 53.7% – 88.9 %)
Negative percent agreement = 99.7 % (95%CI 99.3 % – 99.9 %)

Substantial Equivalency:
The proposed device and predicate device utilize similar enzymatic pathway and design shown to produce equivalent screening performance in a clinical setting. Both devices are intended for use in for the quantitative determination of total galactose (galactose and galactose-1-phosphate) concentrations in blood specimens dried on filter paper as an aid in screening newborns for galactosemia.

Conclusion:
The GSP Neonatal Total Galactose test system demonstrates analytical and screening performance that supports its substantial equivalency with the predicate device, the 3309-001U GSP Neonatal Total Galactose test system (K133652).