February 18, 2022

Hycor Biomedical
Irene Guzman
Sr. Regulatory Affairs Specialist
7272 Chapman Avenue
Garden Grove, California 92841

Re: K220162
Trade/Device Name: Noveos Immunoanalyzer System, Noveos Specific IgE (sIgE), Capture Reagent M006, Alternaria
Regulation Number: 21 CFR 866.5750
Regulation Name: Radioallergosorbent (RAST) immunological test system
Regulatory Class: Class II
Product Code: DHB
Dated: January 19, 2022
Received: January 20, 2022

Dear Irene Guzman:

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,

Ying (Katelin) Mao, Ph.D.
Chief
Division of Immunology
and Hematology Devices
OHT7: Office of In Vitro Diagnostics
and Radiological Health
Office of Product Evaluation and Quality
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: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K220162

Device Name
NOVEOS Specific IgE (sIgE) Assay,
Capture Reagent M006, Alternaria alternata

Indications for Use *(Describe)*

The NOVEOS Specific IgE Assay is an in vitro quantitative assay for the measurement of allergen specific IgE in human serum. NOVEOS Specific IgE Assay is to be used with the NOVEOS Immunoassay Analyzer. It is intended for use as an in vitro diagnostic aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings and is to be used in clinical laboratories.

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 is prepared in accordance with the requirements of 21 CFR Part 807.92.

Date of Preparation: 15-February-2022

Manufacturer: Hycor Biomedical, LLC
7272 Chapman Avenue
Garden Grove, CA 92841

Contact Person: Irene M. Guzman
Senior Regulatory Affairs Specialist
7272 Chapman Ave
Garden Grove, CA 92841
(714) 933-3052
iguzman@hycorbiomedical.com

Device Name:

NOVEOS™ Specific IgE (sIgE) Assay
Capture Reagent – M006, *Alternaria alternata*

Classification

NOVEOS™ Specific IgE (sIgE) Assay
Product Code DHB
Class II
CFR § 866.5750

Substantial Equivalence to: K051218

ImmunoCAP Specific IgE Assay and ImmunoCAP Specific IgE Conjugate 100 and Conjugate 400

ImmunoCAP Allergen m6, *Alternaria alternata*

Indications for Use

The NOVEOS™ Specific IgE Assay is an *in vitro* quantitative assay for the measurement of allergen specific IgE in human serum. NOVEOS Specific IgE Assay is to be used with the NOVEOS Immunoassay Analyzer. It is intended for use as an *in vitro* diagnostic aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings and is to be used in clinical laboratories.

General Description

Reagents

The IgE Common Kit includes: Diluent A, Conjugate IgE, Substrate A, Substrate B, Fluo Beads™. Other required and recommended reagents include the allergen specific Capture Reagent, IgE Calibrator Set (6 levels (kU/L) - Cal 0.07 IgE, Cal 0.35 IgE, Cal 0.70 IgE, Cal 3.5 IgE, Cal 17.5 IgE, Cal 100 IgE), Calibrator Antibody IgE, Probe Wash Pack, Wash Buffer Concentrate, Cuvette Wash Pack, IgE Negative Control Pack, and IgE Positive Control Pack.

The liquid ready-to-use reagents demonstrate on-board stability of up to 48 hours for calibrators and controls and from 5 to 28 days for common assay components.

Assay Principle

The NOVEOS Specific IgE Assay is an immunometric, chemiluminescent procedure for the quantitative determination of IgE of known specificity in human serum samples. It employs fluorescent labelled magnetic, streptavidin coated microparticles which are incubated with a biotinylated allergenic capture reagent, patient sample and monoclonal anti-human IgE antibody: horseradish peroxidase conjugate. If present in the sample, IgE binds to the biotinylated allergen captured to the streptavidin-coated microparticles to form a complex. After a final wash, the resulting complex is incubated with the enzyme substrate and a chemiluminescent signal is generated, the magnitude of which is proportional to the concentration of IgE in the patient sample.

The concentration of allergen-specific IgE is determined from a standard curve, which is traceable to the World Health Organization (WHO) reference reagent serum Immunoglobulin E (IgE) 11/234.

Device Comparison

NOVEOS Specific IgE Assay on the NOVEOS Immunoassay Analyzer is comparable to ImmunoCAP Specific IgE on the ImmunoCAP 100. Both are automated immunoassay systems that process all assay steps and automatically generate results.

Similarities and Differences		
General Device Characteristic	**NOVEOS sIgE Assay**	**ImmunoCAP Specific IgE**
Intended Use	The NOVEOS Specific IgE Assay is an *in vitro* quantitative assay for the measurement of allergen specific IgE in human serum. NOVEOS Specific IgE Assay is to be used with the NOVEOS Immunoassay Analyzer. It is intended for use as an *in vitro* diagnostic aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings and is to be used in clinical laboratories.	ImmunoCAP Specific IgE is an *in vitro* quantitative assay for the measurement of allergen specific IgE in human serum or plasma (EDTA or Na-Heparin). ImmunoCAP Specific IgE is to be used with instruments Phadia 100, Phadia 250, Phadia 1000, Phadia 2500 and Phadia 5000. It is intended for *in vitro* diagnostic use as an aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings, and is to be used in clinical laboratories.
Specimen Type	Serum	Serum or plasma (EDTA, Na Heparin)
Sample Volume	4 µL	40 µL
Assay Type	Quantitative	Same
Detection Antibody	Horseradish peroxidase conjugated mouse anti-human IgE monoclonal antibody	β-Galactosidase-anti-human IgE (mouse monoclonal antibody)
Detection Limit	LoB: 0.03 kU/L LoD: 0.04 kU/L LoQ: 0.17 kU/L	LoB: 0.001 kU/L LoD: 0.02 kU/L LoQ: 0.10 kU/L

Laboratory Setting	Clinical Laboratory	Same
Assay Principles	Fluorescence adjusted, immunometric, chemiluminescent assay	Fluoroenzyme-immunoassay
Solid Phase	Magnetic microparticles	Cellulose derivative
Calibrator Traceability	World Health Organization (WHO) reference reagent serum Immunoglobulin E (IgE) 11/234	Same
Calibration Method	Heterologous interpolation based on Total IgE calibration curve	Same
Number of Calibrators	Six	Same
Calibrator Levels	0, 0.35, 0.7, 3.5, 17.5 and 100 kU/L	Same
Assay Range	0.17-100 kU/L	0.10-100 kU/L
Reaction Temperature	37°C	Same
Instrument(s)	NOVEOS Immunoassay Analyzer	Phadia 100, Phadia 250/1000/2500/5000
Time to First Result	1 hour 45 minutes	1 hour 45 minutes to 2 hour 30 minutes depending on model

The following table shows percent agreements between the NOVEOS sIgE and the ImmunoCAP results using a cut-off value of 0.35 kU/L by testing a total of 257 samples.

		ImmunoCAP sIgE		
		Positive	**Negative**	**Total**
NOVEOS sIgE Assay	**Positive**	99	3	102
	Negative	9	146	155
	Total	108	149	257
	Positive Agreement: 91.7% (95% CI: 84.9% to 95.6%) Negative Agreement: 98.0% (95% CI: 94.2% to 99.3%)			

Clinical Performance

In addition to the ImmunoCAP comparison study, a clinical study that compares NOVEOS sIgE results to the allergic status of n=182 patients was performed to support the diagnostic performance of the NOVEOS sIgE Assay for M006, *Alternaria alternata*. A total of 65 samples with allergic status was confirmed by skin-prick testing and clinical history, and the other 117 samples from healthy, non-atopic donors with no reported allergy. Results are expressed as positive when a sample with a sIgE value is greater than or equal to 0.35 kU/L or negative when a sample with a sIgE value is less than 0.35 kU/L.

		Clinical Diagnosis		
		Atopic	**Non-atopic**	**Total**
NOVEOS sIgE Assay	**Positive**	42	1	43
	Negative	23	116	139
	Total	65	117	182
	Clinical sensitivity: 64.6% (95% CI 52.5% to 75.1%) Clinical specificity: 99.1% (95% CI 95.3% to 99.8%)			

Precision/Reproducibility

Repeatability and within-laboratory precision were determined in accordance with CLSI guideline EP05-A3: *Evaluation of Precision Performance of Quantitative Measurement Procedures – 3rd Edition* and CLSI guideline EP15-A3: *User Verification of Precision and Estimation of Bias – 3rdEdition. A panel of six samples (1 negative and three positive – patient samples plus two controls) was* assayed in duplicate replicates in 2 runs per day for 20 days on one NOVEOS Immunoassay Analyzer for a total of 80 replicates per sample. The SD and % CV of the within-run, between-run, between-day, and total imprecision were calculated for each sample and results are summarized in the following table:

Sample	**N**	**Mean (kU/L)**	**Within-Run (Repeatability)**		**Between-Run**		**Between-Day**		**Total**	
			SD	**CV (%)**	**SD**	**CV (%)**	**SD**	**CV (%)**	**SD**	**CV (%)**
LoQ15	80	0.21	0.01	4.6%	0.02	7.6%	0.01	7.0%	0.02	11.3%
LoQ33	80	0.36	0.01	3.5%	0.02	5.3%	0.01	3.0%	0.03	7.0%
NOVEOS Pos Sample	80	2.77	0.12	4.2%	0.24	8.8%	0.18	6.5%	0.32	11.7%
Lyphochek Pos Sample	80	6.65	0.27	4.1%	0.35	5.3%	0.40	6.0%	0.59	8.9%
PP46	80	8.10	0.24	2.9%	0.32	4.0%	0.49	6.1%	0.64	7.9%
PP28	80	29.54	1.14	3.9%	1.04	3.5%	1.55	5.2%	2.19	7.4%

Lot-to-lot imprecision

Lot-to-Lot imprecision was evaluated with three different lots of the NOVEOS M006, using a panel of serum samples in two replicates per run, two runs per day for twenty days (for a total of 240 replicates per sample). The results are summarized in the following table:

Sample	**N**	**Mean (kU/L)**	**Within-Run**		**Between-Day**		**Between-Lot**		**Total**	
			SD	**CV (%)**	**SD**	**CV (%)**	**SD**	**CV (%)**	**SD**	**CV (%)**
LoQ15	240	0.21	0.01	5.0%	0.01	6.4%	0.00	0.0%	0.02	10.8%

LoQ33	240	0.37	0.01	3.7%	0.01	2.0%	0.01	2.5%	0.03	7.9%
NOVEOS Pos Sample	240	2.80	0.11	3.9%	0.20	7.1%	0.00	0.0%	0.33	11.6%
Lyphochek Pos Sample	240	6.62	0.24	3.7%	0.39	5.8%	0.00	0.0%	0.59	8.9%
PP46	240	7.84	0.26	3.4%	0.46	5.9%	0.22	2.8%	0.67	8.5%
PP28	240	29.33	1.17	4.0%	1.59	5.4%	0.61	2.1%	2.29	7.8%

Site-to-site reproducibility

Site-to-site reproducibility was evaluated by testing a panel of 4 patient pools (one negative and three positive) and 2 controls (run as samples) at three sites using the same lot of reagent. Each sample was tested in five replicates per run, one run per day for five days on one NOVEOS Immunoassay Analyzer at each site (for a total of 75 replicates per sample). The results are summarized in the following table:

	Result Summary		**Within-Run (Repeatability)**		**Between-Day**		**Between-Site**		**Total**	
Panel	**N**	**Mean (kU/L)**	**SD**	**CV(%)**	**SD**	**CV(%)**	**SD**	**CV(%)**	**SD**	**CV(%)**
NOV	75	2.58	0.13	5.0%	0.05	1.9%	0.03	1.2%	0.14	5.4%
PP74	75	0.18	0.01	5.5%	0.01	5.5%	0.02	10.9%	0.02	10.9%
PP75	75	0.40	0.02	5.0%	0.01	2.5%	0.02	5.0%	0.04	10.1%
PP76	75	2.08	0.10	4.8%	0.07	3.4%	0.17	8.2%	0.21	10.1%
PP77	75	20.62	1.01	4.9%	0.89	4.3%	2.55	12.4%	2.89	14.0%

Linearity

Linearity was evaluated in accordance with CLSI guideline I/LA20-3rd Edition*, Analytical Performance Characteristics, Quality Assurance, and Clinical Utility of Immunological Assays for Human Immunoglobulin E (IgE) Antibodies of Defined Allergen Specificities*. Dilutions of M006 specific IgE samples with analyte concentrations from 0.17 to 41.9 kU/L were used to calculate the linear regression statistics below.

Dilution Range (kU/L)	**Regression Equation**	**Slope (95% CI)**	**Intercept (95% CI)**	**R^2**
0.17 – 41.9	y = 1.00x – 0.05	0.99 to 1.01	-0.16 to 0.07	1.000

INTERFERENCE

Interference testing was carried out in accordance with CLSI guideline EP7, *Interference Testing in Clinical Chemistry; Approved Guideline – Third Edition*. The following substances listed in the table below show no significant interference at the indicated test concentrations.

Substance	Concentration
Hemoglobin	200 mg/dL
Conjugated Bilirubin	30 mg/dL
Unconjugated Bilirubin	20 mg/dL
Intralipid	3000 mg/dL
Biotin	3500 ng/mL
Diphenhydramine	19.5 µmol/L
Methylprednisolone	1000 ng/mL
Ranitidine	19.2 µmol/L
Omalizumab	0.12 mg/mL
Human Serum Albumin	120 g/L
Rheumatoid Factor	513 IU/mL

Cross-Reactivity

Cross-reactivity testing was carried out in accordance with CLSI guideline EP7, *Interference Testing in Clinical Chemistry; Approved Guideline – Third Edition*. The cross-reactivity with other human immunoglobulins is non-detectable at physiological concentrations of IgA, IgD, IgM and IgG.

Competitive Inhibition (Analytical Specificity)

Specificity of NOVEOS sIgE Assay, M006, was demonstrated by assessing Competitive Inhibition in accordance with CLSI I/LA20-3rd Edition, *Analytical Performance Characteristics, Quality Assurance, and Clinical Utility of Immunological Assays for Human Immunoglobulin E Antibodies of Defined Allergen Specificities*, *Third Edition*. For M006, all the related (M002, *C. herbarum*) and unrelated allergens (E085, Chicken Feathers; G006, Timothy Grass; and W006, Mugwort) assessed show ≤15% inhibition to M006.

Detection Limit

Limit of Blank (LoB), Limit of Detection (LoD) and Limit of Quantitation (LoQ) were estimated in accordance with CLSI guideline EP17-A2, *Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures; Approved Guideline – Second Edition*. A panel of analyte-free and low IgE samples were assayed on three reagent lots and three instruments across five days. A total of 60 replicates of analyte-free and 300 replicates of low IgE samples were evaluated from which LoB and LoD were determined to be 0.03 kU/L, and 0.04 kU/L, respectively. The LoQ is defined as the lowest analyte concentration with a within-lab precision of 20%CV. A panel of seven low analyte samples was assayed in replicates of two in 2 runs per day for 20 days, 80 replicates total with three lots on one instrument. The LoQ was determined to be 0.12 kU/L. The claimed LoQ was 0.17 kU/L.

Reference Range

The expected value is negative (<0.35 kU/L) for a specific allergen in a non-atopic person. Each laboratory professional should establish its own expected value. This expected value/reference range of NOVEOS sIgE, M006 in the normal population was verified in accordance with CLSI

EP28-A3c, *Defining, Establishing, and Verifying Reference Intervals in the Clinical Laboratory – 3rd Edition* by testing samples from 127 apparently healthy subjects. All 127 samples were tested below <0.35 kU/L.

Stability

Shelf-life stability: Both an ongoing real-time stability study and an accelerated stability study were performed in accordance with CLSI EP25-A *Evaluation of Stability of In Vitro Diagnostic Reagents – First Edition* using three lots of NOVEOS sIgE Assay, M006. The accelerated stability data support the manufacturer's claim of 12-to 48-month unopened shelf-life stability for the individual assay components listed in the table below. The real-time stability study is on-going for M006. Available real-time stability data supports 6-month unopened shelf-life stability when stored at 2-8°C per the manufacturer's instruction for use:

		***Shelf-life Stability (2-8°C)**
Specific IgE Capture Reagent M006		18 months
IgE Common Kit	Diluent A	48 months
	Conjugate IgE	18 months
	Substrate A and Substrate B	24 months
	Fluo Beads™	24 months
IgE Calibrator Set		24 months
Calibrator Antibody IgE		24 months
Others	Probe Wash Pack	24 months
	Wash Buffer Concentrate	48 months
	Cuvette Wash Pack	12 months
Controls	IgE Negative Control Pack	48 months
	IgE Positive Control Pack	24 months
*Results based on accelerated stability data		

On-board stability: A real-time stability study using three lots of NOVEOS sIgE Assay, M006 support the on-board stability claim of 48 hours to 28 days for the individual assay components as summarized in the table below.

		On-board Stability (2-8°C)
Specific IgE Capture Reagent M006		28 days
IgE Common Kit	Diluent A	14 days
	Conjugate IgE	14 days

		On-board Stability (2-8°C)
	Substrate A and Substrate B	14 days
	Fluo Beads™	14 days
IgE Calibrator Set		48 hours
Others	Probe Wash Pack	N/A
	Wash Buffer Concentrate	28 days
	Cuvette Wash Pack	28 days
Controls	IgE Negative Control Pack	48 hours
	IgE Positive Control Pack	48 hours