

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION MEMORANDUM
INSTRUMENT ONLY TEMPLATE**

A. 510(k) Number:

K182793

B. Purpose for Submission:

This submission is for modification of the OPTIGEN Allergen-Specific IgE Assay System. The modified version is the AP 3600 Automated Instrument that provides fully automated assay processing.

C. Manufacturer and Instrument Name:

Hitachi Chemical Diagnostics, Inc., OPTIGEN AP 3600 Automated Instrument

D. Type of Test or Tests Performed:

Chemiluminescent, Allergen-specific IgE assay

E. System Descriptions:

1. Device Description:

The AP 3600 Automated Instrument is a modification of its predecessor product AP 720STM Semi-automated Instrument cleared under K112910. The difference between the two systems is that the modification includes a fully automated processor and does not require the pette to be removed from the instrument for optical reading of test results with the CLA-1 luminometer. The AP 3600 Automated instrument re-hydrates the pette, loads the patient serum sample, incubates for two hours, washes, adds the antibody reagent, incubates for two hours, washes and adds the photoreagent mixture before reading test results. The instrument utilizes its own software-controlled reader to convert light output emitted by the device into Luminometer Count (LMC) units and assigns a class value that can be used as a semi-quantitative estimate of specific IgE levels. The AP 3600 Automated Instrument comes with the OPTIGEN AP 3600 Automated Instrument User Manual.

2. Principles of Operation:

The AP 3600 Automated Instrument is a software controlled system that includes a processor to automate the manual steps of the OPTIGEN Allergen-Specific IgE Assay, from the device re-hydration step to loading of patient serum and reagents and reading of test results after the introduction of photoreagent. Three nozzle heads (sample, reagent,

and wash) in the instrument drive the pette down to open the pette tip for wash or loading of patient sera or reagent. IgE antibodies in the patient sera bind to allergen-coated wells of the pette test chambers. After an incubation period, the pette is washed with buffer solution to remove any unbound serum components. An enzyme-labeled anti-IgE antibody is introduced into the pette that binds to the IgE bound to the wells. After a second washing, the pette is filled with a Photoreagent mixture which, when combined with the enzyme-labeled anti-IgE antibody gives off a chemically generated light (i.e. chemiluminescence). The amount of light emitted by each well is directly proportional to the amount of allergen-specific IgE in the patient's serum. A photomultiplier tube unit in the instrument measures the chemiluminescence light emitted and converts the light output into Luminometer Count (LMC) units. To calculate the patient's IgE response, the instrument automatically subtracts the emission level of the Negative Blanking Control from the emission level of each allergen. AP 3600 Class Values are assigned from 0 to 6 based on the amount of light emitted by the individual allergens in the pette. The amounts of IgE associated with AP 3600 Class values and instrument readings are listed in the following table.

AP 3600 Class Allergy Scoring System of the OPTIGEN Allergen-Specific IgE Assay		
AP 3600™ Class	LMC	Levels of allergen-Specific IgE Concentration
0	0-500	No antibodies detected
1	501-1500	Low levels of antibodies
2	1501-7000	Moderate levels of antibodies
3	7001-36000	High levels of antibodies
4	36001-72000	Very high levels of antibodies
5	72001-150000	
6	150001-500000	

Does the applicant's device contain the ability to transmit data to a computer , webserver, or mobile device?

Yes ☒X_____ or No _____

Does the applicant's device transmit data to a computer, webserver, or mobile device using wireless transmission?

Yes ☒X_____ or No _____

4. Specimen Identification:

The operator places the sample vials in a rack and loads up to five racks with a maximum of ten vials each, one at a time, for scanning of sample barcodes.

5. Specimen Sampling and Handling:

Sample collection, preparation and storage are described in the Package Insert. After the

sample barcodes are scanned, the distribution dispensing nozzle head uses single-use disposable transfer tips to transfer sera samples from the vials in a rack into the sample cups for the assay. If the dilution method is used, the Sample Diluent Dispensing Head dispenses Sample Diluent into the sample cups before samples are transferred to the sample cups.

6. Calibration:

NIST traceable electronic calibrators (Calibrator II) are used to standardize the optical readings across AP 3600 instruments. A calibration factor is calculated as the ratio of the Expected Value printed on the label of the Calibrator divided by the Actual Value that is generated by running the calibrator on the instrument.

7. Quality Control:

The device contains a Positive Procedural Control as well as a Negative Blanking Control. The Positive Procedural Control checks the performance of kit reagents. The Positive Procedural Control must generate a reading greater than or equal to 12500 LMC in the AP 3600. The Negative Blanking Control compensates for any nonspecific IgE binding that may occur. The Negative Blanking Control must generate a reading of equal to or less than 1500 LMC in the AP 3600.

8. Software:

FDA has reviewed applicant's Hazard Analysis and Software Development processes for this line of product types:

Yes ☐ X ☒ or No ☐

F. Regulatory Information:

1. Regulation section:

21 CFR § 866.5750, Radioallergosorbent (RAST) immunological test system

2. Classification:

Class II

3. Product code:

DHB - System, Test, Radioallergosorbent (RAST), Immunological

4. Panel:

Immunology (82)

G. Intended Use:

1. Indications for Use:

The AP 3600 Automated Instrument, in conjunction with the OPTIGEN Allergen-Specific IgE Assay, is for the semi-quantitative measurement of circulating allergen-specific IgE antibodies in human serum. The OPTIGEN Allergen-Specific IgE Assay is intended to aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings. The AP 3600 Automated Instrument is a software-enabled instrument designed for use with the OPTIGEN Allergen-Specific IgE Assay in clinical laboratories for sample processing, measurement analyses, and reporting of OPTIGEN Allergen-Specific IgE Assay results.

2. Special Conditions for Use Statement:

For Prescription Use Only

H. Substantial Equivalence Information:

1. Predicate Device Names and 510(k) numbers:

OPTIGEN AP 720S Semi-Automated Instrument, K112910.

ImmunoCAP Specific IgE Assay and ImmunoCAP Specific IgE Conjugate 100 and Conjugate 400, K051218

2. Comparison with Predicate Devices:

Similarities		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate OPTIGEN AP 720S Semi-Automated Instrument
Indications for Use Statement	The AP 3600 Automated Instrument, in conjunction with the OPTIGEN Allergen-Specific IgE Assay, is for the semi-quantitative measurement of circulating allergen-specific IgE antibodies in human serum. The OPTIGEN Allergen-Specific IgE Assay is intended to aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings. The AP 3600 Automated Instrument is a software-enabled instrument designed for use with the OPTIGEN Allergen-Specific	The AP 720S Semi-Automated Instrument is a semi-automated processor for use with the OPTIGEN Assay. The OPTIGEN Assay is an in vitro diagnostic test for use in the semi-quantitative determination of circulating allergen-specific IgE concentrations in human serum. It is intended to aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings. The device is designed for use in clinical laboratories.

Similarities		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate OPTIGEN AP 720S Semi-Automated Instrument
	IgE Assay in clinical laboratories for sample processing, measurement analyses, and reporting of OPTIGEN Allergen-Specific IgE Assay results.	
Reagent Component	Fully integrated disposable pettes	Same
Testing Environment	Professional use	Same
Sample Type	Serum	Same
Methodology	Chemiluminescence Immunoassay	Same
Assay Format	Semi-quantitative	Same
Processing Temperature	18–30°C	Same
Antibody Reagent	Enzyme-labeled goat anti-human IgE	Same
Consumables	Sample cups, transfer tips, pettes, pipette tips, reagent bottles, wash buffer concentrate bottles	Same

Differences		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate OPTIGEN AP 720S Semi-Automated Instrument
System Configuration	AP 3600 + pettes + consumables	AP 720 STM processor + luminometer + Pettes + consumables
Sample Processing	Fully automated	Semi-automated
Sample Volume	600 uL	490 uL
Calibration/Reader Performance Check	Yes	No
Throughput	Approximately 5.5 hours for 50 pettes	Approximately 4.75 hours for 20 pettes
Reported Unit	Luminometer Count (LMC)	Luminescence Unit (LU)
Light Source	Internal reference light within instrument	External, provided by a separate reader
Reader	Included in AP 3600	CLA-1 Luminometer
Class Allergy Scoring System of the OPTIGEN Allergen-Specific IgE Assay	AP 3600 Class 0 to Class 6	CLA Class 0 to Class 4
Quality Control	Positive Procedural Control: ≥12500 LMC Negative Blanking Control: <1500 LMC	Positive Procedural Control: ≥243 LU Negative Blanking Control: <69 LU

Similarities		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate Phadia ImmunoCAP
Indications for Use Statement	The AP 3600 Automated Instrument, in conjunction with the OPTIGEN Allergen-Specific IgE Assay, is for the semi-quantitative measurement of circulating allergen-specific IgE antibodies in human serum. The OPTIGEN Allergen-Specific IgE Assay is intended to aid in the clinical diagnosis of IgE mediated allergic disorders in conjunction with other clinical findings. The AP 3600 Automated Instrument is a software-enabled instrument designed for use with the OPTIGEN Allergen-Specific IgE Assay in clinical laboratories for sample processing, measurement analyses, and reporting of OPTIGEN Allergen-Specific IgE Assay results.	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, and Phadia 1000. 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.
Sample Processing	Fully automated	Same
Antibody Reagent	Enzyme-labeled goat anti-human IgE	Same
Testing Environment	Clinical laboratories	Same

Differences		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate Phadia ImmunoCAP
System Configuration	AP 3600 + pettes + consumables	Phadia 100, 250 or 1000 + ImmunoCAP Specific IgE reagents
Methodology	Chemiluminescence immunoassay	Fluoroenzyme immunoassay
Assay Format	Semi-quantitative	Quantitative
Sample Type	Serum	Serum and plasma (EDTA or sodium heparin)
Minimum Sample Volume	600 µL	40–200 µL
Processing/ Temperature	18–30°C	37°C
Reagent Component	Fully integrated disposable pettes	Modular in concept and are available individually
Reported Unit	Luminometer Count (LMC)	kU _A /L

Differences		
Item	New Device OPTIGEN AP 3600 Automated Instrument	Predicate Phadia ImmunoCAP
Reader	Included in AP 3600	Phadia instruments
Class Allergy Scoring System	AP 3600 Class Allergy Scoring System of the OPTIGEN Allergen- Specific IgE Assay: Class 0 to Class 6	ASM (Alternate Scoring Method): Class 0/1 to Class 6

I. Special Control/Guidance Document Referenced:

CLSI EP05-A3 — Evaluation of Precision Performance of Quantitative Measurement Procedures

CLSI EP6-A — Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline

CLSI EP17-A2 — Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures; Approved Guideline

J. Performance Characteristics:

1. Analytical Performance:

All results met the manufacturers pre-determined acceptance criteria.

a. Method comparison with predicate device:

A study was performed to compare results obtained with the OPTIGEN Universal Panel 20 using the AP 3600 Automated Instrument to the results obtained by the comparator method, Thermos Fisher ImmunoCAP Specific IgE. A total of 30–51 positive serum samples (with total IgE concentration ≥ 20 IU/mL) and 99–130 negative serum samples (with total IgE concentration < 20 IU/mL) were assayed in singleton by both methods. The samples tested (N) represent all AP 3600 classes, i.e. Class 0 to Class 6. The positive percentage agreement (PPA), negative percentage agreement (NPA), and total percentage agreement (TPA) for each allergen in the OPTIGEN Universal Panel 20 were calculated and are summarized in the table below:

OPTIGEN Universal Panel 20			Positive Samples			Negative Samples			All Samples		
#	Allergen		N	PPA (%)	95% CI	N	NPA (%)	95% CI	N	TPA (%)	95% CI
1	Alternaria	m6	44	91.3 (42/46)	79.7–96.6	109	99.1 (108/109)	95.0–99.8	155	96.8 (150/155)	92.7–98.6
2	Aspergillus	m3	36	75.0 (27/36)	58.9–86.3	111	97.3 (108/111)	92.4–99.1	147	91.8 (135/147)	86.3–95.3
3	Birch, White	t3	34	97.1 (33/34)	85.1–99.5	101	99.0 (100/101)	94.6–99.8	135	98.5 (133/135)	94.8–99.6
4	Cat	e1	51	96.1 (49/51)	86.8–98.9	99	98.0 (97/99)	92.9–99.4	150	97.3 (146/150)	93.3–99.0
5	Cladosporium	m2	41	73.2 (30/41)	58.1–84.3	109	96.3 (105/109)	90.9–98.6	150	90.0 (135/150)	84.2–93.8
6	Cockroach Mix	i6/i206	39	92.3 (36/39)	79.7–97.4	104	96.2 (100/104)	90.5–98.5	143	95.1 (136/143)	90.2–97.6
7	Codfish	f3	34	94.1 (32/34)	80.9–98.4	115	96.5 (111/115)	91.4–98.6	149	96.0 (111/149)	91.5–98.1
8	Dog	e5	51	94.1 (48/51)	84.1–98.0	101	100.0 (101/101)	96.3–100.0	152	98.0 (149/152)	94.4–99.3
9	Egg white	f1	34	94.1 (32/34)	80.9–98.4	121	90.1 (109/121)	83.5–94.2	155	91.0 (141/155)	85.4–94.5
10	Latex	k82	30	100 (30/30)	88.7–100.0	105	91.4 (96/105)	84.5–95.4	135	93.3 (96/135)	87.8–96.5
11	Milk	f2	33	90.9 (30/33)	76.4–96.9	130	86.2 (112/130)	79.2–91.1	163	87.1 (142/163)	81.1–91.4
12	Mite Farinae	d2	42	88.1 (37/42)	75.0–94.8	104	96.2 (100/104)	90.5–98.5	146	93.8 (137/146)	88.7–96.7
13	Mite Pteronyssinus	d1	42	95.2 (40/42)	84.2–98.7	104	97.1 (101/104)	91.9–99.0	146	96.6 (141/146)	92.2–98.5
14	Mugwort	w6	33	100 (33/33)	89.6–100.0	101	98.0 (99/101)	93.1–99.5	134	98.5 (99/143)	94.7–99.6
15	Peanut	f13	40	95.0 (38/40)	83.5–98.6	100	97.1 (100/103)	91.8–99.0	143	96.5 (138/143)	92.1–98.5
16	Ragweed mix I	w1/w3	32	93.8 (30/32)	79.9–98.3	99	98.0 (97/99)	92.9–99.4	131	96.9 (127/131)	92.4–98.8
17	Rice, Brown	f9	33	93.9 (31/33)	80.4–98.3	102	99.0 (101/102)	94.7–99.8	135	97.8 (132/135)	93.7–99.2
17	Soybean	f14	33	100 (33/33)	89.6–100.0	111	94.6 (105/111)	88.7–97.5	144	95.8 (105/144)	91.2–98.1
18	Timothy grass	g6	43	95.3 (41/43)	84.5–98.7	103	94.2 (97/103)	87.9–97.3	146	94.5 (138/146)	89.6–97.2
20	Wheat	f4	40	100 (40/40)	91.2–100.0	103	93.2 (96/103)	86.6–96.7	143	95.1 (136/143)	90.2–97.6

The PPA, NPA and TPA for all allergens in the OPTIGEN Universal Panel 20 are summarized in the table below:

		Comparator Method		
		Positive (Class 1 and above)	Negative (Class 0)	Total
OPTIGEN Universal Panel 20 on AP3600	Positive (Class 1 and above)	712	92	804
	Negative (Class 0)	55	2043	2098
	Total	767	2135	2902
PPA: 92.8 % (712/767) 95% CI: 91.0 – 94.0% NPA: 95.7% (2043/2135) 95% CI: 95.0 – 96.0% TPA: 94.9% (2755/2902) 95% CI: 94.1 – 95.7%				

A comparison by each AP 3600 class was also performed for all allergens and all serum samples tested by the two methods to determine the number of misclassifications. The results are summarized in the table below. For all AP 3600 classes, the total number of disagreements between the two methods is 582 or 20.1% (582/2902). The majority of disagreements (428/582 or 73.5%) were within one class. A total of 134 (134/582 or 23%) differed by two classes, 19 (19/582 or 3.2%) differed by three classes and one (1/582 or 0.17%) differed by four classes.

		Comparator Method							
		Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Total
OPTIGEN Universal Panel 20 on AP3600	Class 0	2043	21	25	7	1	1	0	2098
	Class 1	57	13	46	16	0	0	0	132
	Class 2	27	28	116	91	9	0	0	271
	Class 3	8	5	57	92	38	4	0	204
	Class 4	0	0	5	30	17	8	3	63
	Class 5	0	0	1	16	19	14	4	54
	Class 6	0	0	1	1	24	29	25	80
	Total	2135	67	251	253	108	56	32	2902

A comparison between AP3600 and the comparator method for samples that differ by one AP 3600 class show strong correlation (84% and above) for all classes except Class 4 (68%). There is no risk of misclassification as these samples are all positive.

	OPTIGEN Universal Panel 20 on AP3600 vs. Comparator Method					
	Positive (Class 1 and above)					
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Within one class	62/67 (92.5%)	219/251 (87.3%)	213/253 (84.2%)	74/108 (68%)	51/56 (91.1%)	29/32 (90.6%)

The numbers of samples that differ by one AP 3600 class for each allergen tested are summarized in the table below.

OPTIGEN Universal Panel 20 on AP3600 vs. Comparator Method									
#	Allergen		N	Within one class	#	Allergen		N	Within one class
1	Alternaria	m6	155	147 (95%)	11	Milk	f2	163	154 (94%)
2	Aspergillus	m3	147	129 (88%)	12	Mite Farinae	d2	146	136 (93%)
3	Birch, White	t3	135	131 (97%)	13	Mite Pteronyssinus	d1	146	137 (94%)
4	Cat	e1	150	134 (89%)	14	Mugwort	w6	134	133 (99%)
5	Cladosporium	m2	150	136 (91%)	15	Peanut	f13	143	137 (96%)
6	Cockroach Mix	i6/i206	143	136 (95%)	16	Ragweed mix I	w1/w3	131	125 (95%)
7	Codfish	f3	149	138 (93%)	17	Rice, Brown	f9	135	132 (98%)
8	Dog	e5	152	150 (99%)	18	Soybean	f14	144	143 (99%)
9	Egg white	f1	155	146 (94%)	19	Timothy grass	g6	146	133 (91%)
10	Latex	k82	135	132 (98%)	20	Wheat	f4	143	139 (97%)

b. *Precision/Reproducibility:*

The precision of the OPTIGEN Universal Panel 20 on the AP 3600 Automated Instrument was assessed with 23 pooled serum samples according to CLSI guideline EP05-A3 in a study with a total of 40 runs, (two runs per day over the course of 20 days or eight runs per day for five days) or a total of 42 runs (three runs per day for 14 days), using one reagent lot and one instrument. Each sample was tested by one operator in two replicates per run giving a total of 80 or 84 replicates per test sample. The test samples represent all the AP 3600 Classes (Class 0 – Class 6) with the following ranges of values in LMC unit as summarized in the table below:

Classification Level of Samples in the Test Panel		
AP 3600 Class	Luminometer Count (LMC)	
	Lower Limit	Upper Limit
Class 0*	250	500
Low Class 1 [^]	501	750
High Class 1 [#]	1000	1500
Class 2	1501	7000
Class 3	7001	36000
Class 4	36001	72000
Class 5	72001	150000
Class 6	150001	500000
*Class 0: Extends from 25% below cut-off to 50% below cut-off [^] Low Class 1: Extends from 25% above cut-off to 50% above cut-off [#] High Class 1: Extends from the midpoint of Class-1 (1000 LMC) to the upper limit of Class 1 (1500 LMC)		

The SD and %CV for between-run, between-day, and total imprecision are calculated for each allergen at each Class level and the results are summarized in the tables below.

Between-Run																	
OPTIGEN Universal Panel 20		AP 3600 Class															
		Class 0		Low Class 1		High Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
#	Allergen	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
1	Alternaria	132	28	139	17	238	18	471	16	5559	18	3714	10	8072	10	n/a	n/a
2	Aspergillus	96	21	139	15	156	11	895	18	895	7	2053	5%	n/a	n/a	n/a	n/a
3	Birch, White	111	23	142	15	206	12	1389	27	1670	17	14983	23	n/a	n/a	n/a	n/a
4	Cat	112	39	222	19	344	18	737	12	3000	12	5789	14	7685	11	17431	6
5	Cladosporium	60	21	89	16	209	11	497	9	1158	7	n/a	n/a	n/a	n/a	n/a	n/a
6	Cockroach Mix	75	13	131	14	176	11	360	13	1413	14	3679	9	n/a	n/a	12400	6
7	Codfish	186	36	113	12	219	17	420	12	420	4	4245	11	n/a	n/a	16017	6
8	Dog	99	28	180	1	195	19	418	14	3107	13	5381	12	10749	9	n/a	n/a
9	Egg White	71	22	120	20	260	12	476	15	476	5	4436	9	6669	6	n/a	n/a
10	Latex	122	31	185	21	280	20	484	13	1478	10	7931	12	n/a	n/a	15102	5
11	Milk	65	19	83	13	180	14	468	11	468	2	4785	6	6283	6	6051	3
12	Mite F	114	35	123	16	203	14	276	11	276	3	6165	15	11396	11	18212	5
13	Mite P	112	23	87	13	163	10	233	13	233	1	2345	5	2836	4	18098	4
14	Mugwort	111	24	167	17	242	18	376	13	2002	20	n/a	n/a	7484	8	11048	7
15	Peanut	85	28	183	25	289	13	330	17	330	2	3249	8	9146	8	18409	6
16	Ragweed Mix I	147	31	189	26	448	25	1286	22	4388	22	11904	22	n/a	n/a	n/a	n/a
17	Rice, Brown	67	23	258	28	236	18	671	18	1940	18	7320	19	n/a	n/a	n/a	n/a
18	Soybean	107	32	127	12	117	8	257	9	658	6	2295	6	n/a	n/a	n/a	n/a
19	Timothy grass	156	29	119	17	294	21	389	9	2441	9	8873	14	11273	13	15673	8
20	Wheat	87	20	131	10	275	19	408	8	408	4	4785	15	7164	6	n/a	n/a

Between-Day																	
OPTIGEN Universal Panel 20		AP 3600 Class															
		Class 0		Low Class 1		High Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
#	Allergen	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
1	Alternaria	53	11	87	11	76	6	235	8	1192	4	1937	5	878	1	n/a	n/a
2	Aspergillus	56	12	129	14	161	11	489	10	489	4	1633	4	n/a	n/a	n/a	n/a
3	Birch, White	47	10	154	16	375	23	834	16	0	0	12949	20	n/a	n/a	n/a	n/a
4	Cat	105	37	126	11	358	18	297	5	0	0	2748	7	0	0	21415	7
5	Cladosporium	61	21	155	29	203	11	1626	28	1856	11	n/a	n/a	n/a	n/a	n/a	n/a
6	Cockroach Mix	89	16	143	15	194	12	255	9	939	9	2143	5	n/a	n/a	10383	5
7	Codfish	46	9	150	16	220	17	346	10	346	3	3574	9	n/a	n/a	20664	8
8	Dog	75	22	41	4	155	15	181	6	3058	12	5394	12	12666	10	n/a	n/a
9	Egg White	58	18	45	7	111	5	283	9	283	3	2195	5	7627	7	n/a	n/a
10	Latex	109	27	28	3	153	11	385	11	917	6	2767	4	n/a	n/a	25639	9
11	Milk	66	20	106	17	292	23	396	9	396	2	3921	5	5546	5	9800	5
12	Mite F	76	23	116	15	315	21	420	16	420	5	5270	12	7049	7	15821	4
13	Mite P	116	24	142	22	62	4	348	19	348	2	3681	8	2156	3	24480	6
14	Mugwort	0	0	109	11	190	14	334	11	1007	10	n/a	n/a	0	0	10482	7
15	Peanut	82	27	126	17	418	19	38	2	38	0	2676	7	8341	7	19176	6
16	Ragweed Mix I	106	22	72	10	398	22	462	8	2636	13	0	0	n/a	n/a	n/a	n/a
17	Rice, Brown	77	26	94	10	156	12	0	0	0	0	2782	7	n/a	n/a	n/a	n/a
18	Soybean	71	21	90	8	157	11	269	9	615	6	825	2	n/a	n/a	n/a	n/a

Between-Day																	
OPTIGEN Universal Panel 20		AP 3600 Class															
		Class 0		Low Class 1		High Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
#	Allergen	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
19	Timothy grass	96	18	94	13	0	0	433	10	2565	10	8721	14	4865	6	6551	3
20	Wheat	107	25	153	12	215	15	360	7	360	3	2026	6	8680	8	n/a	n/a

Total Within-Laboratory Imprecision																	
OPTIGEN Universal Panel 20		AP 3600 Class															
		Class 0		Low Class 1		High Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
#	Allergen	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
1	Alternaria	153	33	209	26	304	24	652	22	6186	20	4189	11	8797	11	n/a	n/a
2	Aspergillus	120	26	211	22	290	21	1026	21	1026	8	2623	6	n/a	n/a	n/a	n/a
3	Birch, White	141	30	275	29	575	35	1658	33	3679	38	20708	32	n/a	n/a	n/a	n/a
4	Cat	157	55	263	23	516	26	1144	19	4633	18	8110	20	10277	14	27612	9
5	Cladosporium	107	37	208	39	375	20	1709	29	2352	13	n/a	n/a	n/a	n/a	n/a	n/a
6	Cockroach Mix	136	24	227	24	285	17	598	22	1954	19	4492	11	n/a	n/a	21898	11
7	Codfish	191	37	207	23	318	25	812	23	812	7	6127	16	n/a	n/a	28606	11
8	Dog	130	37	258	25	309	31	619	21	4459	18	7848	17	20000	16	n/a	n/a
9	Egg White	92	29	165	28	331	15	554	17	554	6	6209	13	10899	10	n/a	n/a
10	Latex	164	41	233	27	336	24	740	20	3187	21	10264	16	n/a	n/a	30390	10
11	Milk	111	33	175	27	343	27	816	18	816	3	9034	12	10351	10	14115	7
12	Mite F	145	45	187	25	461	31	677	26	677	8	9362	22	16156	15	31416	9
13	Mite P	171	35	174	27	239	15	535	29	535	2	6122	14	5629	8	35038	8
14	Mugwort	131	28	243	24	400	29	503	17	2241	22	n/a	n/a	25927	26	17346	11
15	Peanut	128	42	240	33	646	29	546	28	546	4	6974	17	13267	11	31075	10
16	Ragweed Mix I	182	38	226	31	640	35	1641	28	7429	38	11997	23	n/a	n/a	n/a	n/a
17	Rice, Brown	111	38	279	30	331	25	891	23	2300	22	7944	20	n/a	n/a	n/a	n/a
18	Soybean	133	40	204	19	225	15	496	16	1102	10	3507	10	n/a	n/a	n/a	n/a
19	Timothy grass	204	38	163	23	326	23	719	16	3641	14	18532	29	23382	28	26756	13
20	Wheat	160	37	231	18	420	28	711	13	711	7	5283	16	14183	13	n/a	n/a

The %CV of the responses of all allergens tested was calculated for each class and summarized in the table below for each variance component evaluated:

Variance (%CV)	AP 3600 Class						
	Class 0	Class 1*	Class 2	Class 3	Class 4	Class 5	Class 6
Between-Run	27	18	16	13	14	9	6
Between-Day	20	15	13	8	10	7	7
Total	36	26	24	19	20	16	10
*includes low and high							

c. *Linearity:*

Five representative allergens of the OPTIGEN Universal Panel 20 were used to demonstrate linearity of the continuous LMC signal. A high-positive neat serum sample was diluted down across the lower end of the measuring range with a negative serum sample (<LoD). The resulting 16 diluted samples were tested in triplicates with one lot of the OPTIGEN Universal Panel 20 using the AP 3600 Automated Instrument. Linear regression and polynomial analysis was performed according to CLSI guideline EP6-A. The results of the regression analysis and the claimed linear range for the allergens tested are summarized in the table below:

Allergen		Regression Equation	95% CI Slope	95% CI Intercept	r ²	Linear Range (LMC)
Codfish	f 3	y= 1.01x – 1105	0.95–1.07	–8510–6301	0.99	77–298041
Mite Farinae	d2	y= 1.07x + 6591	0.94–1.19	–3858–17040	0.98	136–210488
Mite Pteronyssinus	d1	y= 1.00x + 484	0.95–1.05	–4665–5634	0.99	73– 231799
Peanut	f13	y= 1.04x + 15101	0.95–1.05	–2803–33006	0.96	75– 286476
Timothy grass	g6	y= 1.02x + 2679	0.95–1.05	–4971–10330	0.99	240–275740

d. *Carryover:*

Not applicable

e. *Interfering Substances:*

Refer to K051677

2. Other Supportive Instrument Performance Data Not Covered Above:

Detection Limit:

The Limit of Blank (LoB) and Limit of Detection (LoD) were determined for the OPTIGEN Universal Panel 20 on the AP 3600 Automated Instrument. The methods used were in alignment with CLSI EP17-A2. The LoB is based on 75 blank measurements (one blank sample tested in 25 replicates × one run/day × three days) for each allergen for each of two reagent lots. The LoD for each allergen was determined by running four low level “Class 1” sera. Each serum was run in duplicates per run with two runs per day over four different days for each of two reagent lots. For each allergen, the criterion for use of a serum to calculate the LoB and LoD was that the mean LMC for the runs for that allergen had to be less than the cut-off between undetectable (Class 0: 0–500 LMC) and low positive (Class 1: 501–1500 LMC). The results are summarized in the table below. Results showed that the LoB is above 0 LMC for six of the 20 allergens and that LoD is not uniform across allergens and instead was a range from 59 LMC to 241 LMC.

OPTIGEN Universal Panel 20			LoB (LMC)	LoD (LMC)
#	Allergen			
1	Birch, White	t3	71	148
2	Ragweed mix I	w1/w3	0	113
3	Timothy grass	g6	159	240
4	Mugwort	w6	0	67
5	Latex	k82	0	73
6	Soybean	f14	0	64
7	Rice, Brown	f9	0	74
8	Codfish	f3	0	77
9	Wheat	f4	16	94
10	Peanut	f13	0	75
11	Egg white	f1	0	68
12	Milk	f2	175	241
13	Aspergillus	m3	0	92
14	Cladosporium	m2	0	81
15	Alternaria	m6	0	59
16	Dog	e5	63	137
17	Cat	e1	0	84
18	Cockroach Mix	i6/i206	0	66
19	Mite Pteronyssinus	d1	0	73
20	Mite Farinae	d2	45	136

Instrument-to-instrument variability:

To evaluate instrument-to-instrument variability, two pooled patient serum samples were tested in four replicates for five days using at least three OPTIGEN AP 3600 instruments. The % CV of the responses of all allergens tested was calculated for each class and summarized in the table below for each variance component evaluated:

Variance (%CV)	AP 3600™ Class						
	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Between-Run	19	20	14	15	13	9	7
Between-Day	27	21	15	16	19	14	12
Between-Instrument	22	11	7	1	2	5	2
Total	39	32	23	23	24	18	14

K. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Parts 801 and 809, as applicable.

L. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.