September 20, 2019

Siemens Healthcare Diagnostics Inc.
Paul DaSilva
Regulatory Affairs Specialist
511 Benedict Avenue
Tarrytown, NY 10591

Re: K191533
Trade/Device Name: ADVIA Centaur® Testosterone II (TSTII), ADVIA Centaur® SHBG
Regulation Number: 21 CFR 862.1680
Regulation Name: Testosterone test system
Regulatory Class: Class I, reserved
Product Code: CDZ
Dated: June 7, 2019
Received: June 10, 2019

Dear Paul DaSilva:

This letter corrects our substantially equivalent letter of August 28, 2019.

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,

Kellie B. Kelm -S

Kellie B. Kelm, Ph.D.
Acting 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

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)*
k191533

Device Name
ADVIA Centaur® Testosterone II (TSTII)
ADVIA Centaur® SHBG

Indications for Use *(Describe)*

ADVIA Centaur® Testosterone II (TSTII)

The ADVIA Centaur® Testosterone II (TSTII) assay is for in vitro diagnostic use in the quantitative determination of total testosterone (bound and unbound) in human serum and plasma using the ADVIA Centaur XP system.

Measurements of testosterone are used in the diagnosis and treatment of disorders involving the male sex hormones (androgens), including primary and secondary hypogonadism, delayed or precocious puberty, impotence in males and, in females, hirsutism (excessive hair) and virilization (masculinization) due to tumors, polycystic ovaries, and adrenogenital syndromes.

ADVIA Centaur® SHBG

The ADVIA Centaur® SHBG assay is an in vitro diagnostic immunoassay for the quantitative determination of sex hormone-binding globulin (SHBG) in human serum and plasma using the ADVIA Centaur XP system.

The ADVIA Centaur SHBG assay is intended for use as an aid in the diagnosis of androgen disorders.

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.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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This 510(k) Summary of Safety and Effectiveness is being submitted in accordance with the requirements of 21 CFR 807.92 and the Safe Medical Device Act of 1990.

The assigned 510(k) Number is: K191533

1. Date Prepared

June 7, 2019

2. Applicant Information

Contact: Paul DaSilva
Regulatory Affairs Specialist

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Tarrytown, NY 10591-5097

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Email paul.dasilva@siemens-healthineers.com

3. Regulatory Information

Table 1. Regulatory Information for ADVIA Centaur® Testosterone II (TSTII)

Trade Name	ADVIA Centaur® Testosterone II (TSTII)
Common Name	Radioimmunoassay, testosterones and dihydrotestosterone
Classification Name	Testosterone test system
FDA Classification	Class I (Reserved)
Review Panel	Clinical Chemistry
Product Code	CDZ
Regulation Number	862.1680

Table 2. Regulatory Information for ADVIA Centaur® SHBG

Trade Name	ADVIA Centaur® SHBG
Common Name	Radioimmunoassay, testosterones and dihydrotestosterone
Classification Name	Testosterone test system
FDA Classification	Class I (Reserved)
Review Panel	Clinical Chemistry (75)
Product Code	CDZ
Regulation Number	862.1680

4. Predicate Device Information

ADVIA Centaur® Testosterone II (TSTII)

Predicate Device Name: ADVIA Centaur® Testosterone II (TSTII)

510(k) Number: K151986

The re-standardized ADVIA Centaur® Testosterone II (TSTII) is substantially equivalent to the ADVIA Centaur® Testosterone II (TSTII) that was cleared under 510(k) (K151986), as shown below in the Substantial Equivalence Information section.

ADVIA Centaur® SHBG

Predicate Device Name: ADVIA Centaur® SHBG

510(k) Number: K151986

The ADVIA Centaur® SHBG with new reference intervals in the Instructions for Use (Package Insert) does not require any other device modifications (i.e. no change to design or manufacturing process). Therefore, as shown below in the Substantial Equivalence Information section, the predicate and subject devices are the same.

5. Intended Use / Indications for Use

ADVIA Centaur® Testosterone II (TSTII)

The ADVIA Centaur® Testosterone II (TSTII) assay is for in vitro diagnostic use in the quantitative determination of total testosterone (bound and unbound) in human serum and plasma using the ADVIA Centaur® XP system.

Measurements of testosterone are used in the diagnosis and treatment of disorders involving the male sex hormones (androgens), including primary and secondary hypogonadism, delayed or precocious puberty, impotence in males and, in females, hirsutism (excessive hair) and virilization (masculinization) due to tumors, polycystic ovaries, and adrenogenital syndromes.

ADVIA Centaur® SHBG

The ADVIA Centaur® SHBG assay is an in vitro diagnostic immunoassay for the quantitative determination of sex hormone-binding globulin (SHBG) in human serum and plasma using the ADVIA Centaur® XP system.

The ADVIA Centaur® SHBG assay is intended for use as an aid in the diagnosis of androgen disorders.

6. Device Description

Table 3. Summary of Ingredients of the Re-standardized ADVIA Centaur® Testosterone II (TSTII) Components

Component	Volume	Ingredients
ADVIA Centaur® Testosterone II (TSTII) Primary Reagent ReadyPack (included in assay kit)		
ADVIA Centaur® Testosterone II (TSTII) Lite Reagent	10.0 mL/pack	Acridinium ester-labeled hapten (36 µg/mL) in buffered saline with preservatives

Table 3. Summary of Ingredients of the Re-standardized ADVIA Centaur® Testosterone II (TSTII) Components

Component	Volume	Ingredients
ADVIA Centaur® Testosterone II (TSTII) Solid Phase Reagent	17.0 mL/pack	Streptavidin-coated latex particles (0.33 g/L) in buffered saline with preservatives
ADVIA Centaur® Testosterone II (TSTII) Ancillary Reagent ReadyPack (included in assay kit)		
ADVIA Centaur® Testosterone II (TSTII) Releasing Agent	10.0 mL/pack	Steroid releasing agent (0.4 µg/mL) and biotinylated sheep monoclonal anti-testosterone antibody (27 µg/L) in buffered saline and preservatives

Table 4. Summary of Ingredients of the ADVIA Centaur® SHBG Components

Component	Volume	Ingredients
ADVIA Centaur® SHBG Primary Reagent ReadyPack (included in assay kit)		
ADVIA Centaur® SHBG Lite Reagent	3.0 mL/pack	Mouse monoclonal anti-SHBG antibody (~130 ng/mL) labeled with acridinium ester in HEPES-buffered saline with bovine serum albumin, mouse serum, sodium azide (< 0.1%), surfactant, protein stabilizers and preservatives
ADVIA Centaur® SHBG Solid Phase Reagent	11.0 mL/pack	Streptavidin coupled to latex paramagnetic particles (~150 µg/mL) in HEPES buffered saline with bovine serum albumin, mouse serum, sodium azide (< 0.1%), surfactant, protein stabilizers and preservatives
ADVIA Centaur® SHBG Ancillary Well Reagent	3.0 mL/pack	Biotinylated monoclonal mouse anti-SHBG antibody (~6 µg/mL) in HEPES buffered saline with bovine serum albumin, mouse serum, sodium azide (< 0.1%), surfactant, protein stabilizers and preservatives

7. Purpose of the Submission

The purpose of this submission is to submit a re-standardized ADVIA Centaur® Testosterone II (TSTII) and to submit the new reference intervals data for the ADVIA Centaur® SHBG that was cleared under K151986. For the ADVIA Centaur® SHBG the only change is the new reference intervals.

8. Substantial Equivalence Information – Comparison of Predicate Device and Modified Device

Both the re-standardized ADVIA Centaur® Testosterone II (TSTII) (Modified Device) and the current ADVIA Centaur® Testosterone II (TSTII) (Predicate Device cleared under K151986) employ the same prepackaged reagents for use on automated test systems. The Intended Use / Indications for Use, assay principle, and reagent formulations are the same. The major differences between the Modified and Predicate devices are the re-standardization and change in reference interval data. However, despite these differences, the performance and accuracy of the Modified Device are substantially equivalent to that of the Predicate

Device. The method comparison study between the Modified Device and the Predicate Device demonstrate acceptable correlation between these assays. A comparison of these assays is shown in the following table:

Table 5. Comparison of ADVIA Centaur® Testosterone II (TSTII) to Predicate

Item	Re-standardized ADVIA Centaur® Testosterone II (TSTII) (Candidate Device)	ADVIA Centaur® Testosterone II (TSTII) (Predicate Device – K151986)
Intended Use	For *in vitro* diagnostic use in the quantitative determination of total testosterone (bound and unbound) in serum using the ADVIA Centaur and ADVIA Centaur XP Systems.	Same
Indications for Use	Measurements of testosterone are used in the diagnosis and treatment of disorders involving the male sex hormones (androgens), including primary and secondary hypogonadism, delayed or precocious puberty, impotence in males and, in females hirsutism (excessive hair) and virilization (masculinization) due to tumors, polycystic ovaries, and adrenogenital syndromes.	Same
Methodology	Chemiluminescence	Same
Assay Protocol	Competitive immunoassay	Same
Traceability/ Standardization	ID-LC-MS/MS	Same
Specimen Type	Human serum and plasma	Same
Lower Limit of Measuring Range	LoQ	Same
Sample Volume	20 µL	Same
Measuring Range	7.0–1500 ng/dL	Same
Calibration	2-point calibration	Same

The following table demonstrates substantial equivalence between the ADVIA Centaur® SHBG (Candidate Device) with new reference intervals in the Instructions for Use (Package Insert) and the currently marketed ADVIA Centaur® SHBG (Predicate Device) that was cleared under 510(k) K151986.

Table 6. Comparison of ADVIA Centaur® SHBG to Predicate

Item	ADVIA Centaur® SHBG: WHO 08/226 2nd IS (Candidate Device – New Reference Intervals)	ADVIA Centaur® SHBG: WHO 08/226 2nd IS (Predicate Device – Unmodified Labeling)
Intended Use	The ADVIA Centaur® SHBG assay is an *in vitro* diagnostic immunoassay for the quantitative determination of sex hormone-binding globulin (SHBG) in human serum and plasma using the ADVIA Centaur® XP system.	Same
Indications for Use	Measurement of SHBG are used in the diagnosis and treatment of disorders involving the male sex hormones (androgens), including primary and secondary hypogonadism, delayed or precocious puberty, impotence in males and, in females, hirsutism (excessive hair) and virilization (masculinization) due to tumors, polycystic ovaries, and adrenogenital syndromes.	Same
Methodology	Chemiluminescence	Same
Assay Protocol	Sandwich immunoassay	Same
Traceability/ Standardization	WHO 2nd International Standard (08/226)	Same
Specimen Type	Human serum and plasma	Same
Sample Volume	20 µL	Same
Measuring Range	1.60–180 nmol/L	Same
Calibration	2-point calibration	Same

9. Standard/Guidance Document References

The following recognized standards from Clinical Laboratory Standards Institute (CLSI) were used as a basis of the study procedures described in this submission:

- Evaluation of Precision Performance of Quantitative Measurement Procedures; Approved Guideline – Third Edition (CLSI EP05-A3, 2004; Recognition Number 7-251)
- Evaluation of the Linearity of Quantitative Measurement Procedures: A Statistical Approach; Approved Guideline – 1st Edition (CLSI EP06-A, 2003; Recognition Number 7-193)
- Measurement Procedure Comparison And Bias Estimation Using Patient Samples - Third Edition (CLSI EP9-A3, 2013; Recognition Number 7-245)
- Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures; Approved Guideline -- Second Edition (CLSI EP17-A2, 2013; Recognition Number 7-233)

- Defining, Establishing and Verifying Reference Intervals in the Clinical Laboratory; Approved Guideline – Third Edition (CLSI EP28-A3c – formerly C28-A3c, 2010; Recognition Number 7-224)

10. Performance Characteristics: Re-standardized ADVIA Centaur® Testosterone II (TSTII)

Substantial equivalence of the re-standardized ADVIA Centaur® Testosterone II (TSTII) demonstrated by testing several performance characteristics with the following studies:

- Detection Capability (LoB, LoD, and LoQ)
- Linearity
- Precision
- Method Comparison
- Reference Interval

In addition, the following study was performed:

- Biotin Interference

The performance studies listed below were determined not to be impacted by the re-standardization of the ADVIA Centaur® Testosterone II (TSTII). These studies are from the original 510(k) K151986 and are used in the labeling for the re-standardized ADVIA Centaur® Testosterone II (TSTII).

- Dilution Recovery
- Cross reactivity
- Interfering substances
- Matrix Comparison
- Reagent shelf life stability
- Reagent On-Board Stability and Calibration Interval
- Open Vial Stability

10.1 Detection Limit

The limit of blank (LoB), limit of detection (LoD), and the limit of quantitation (LoQ) were determined as described in CLSI protocol EP17-A2. The Re-standardized ADVIA Centaur® Testosterone II (TSTII) has an LoB of 2.50 ng/dL, an LoD of 5.00 ng/dL, and an LoQ of 7.00 ng/dL. The LoB is defined as the highest measurement result that is likely to be observed for a blank sample. The LoD is defined as the lowest concentration of testosterone that can be detected with 95% probability. The LoQ is defined as the lowest concentration of testosterone that can be detected at a total CV of 20%.

10.2 Precision

A 20-day precision study was performed according to CLSI EP5-A3. Samples included three levels of controls, 5 medical decision pools and 1 female patient serum pool. Samples were assayed twice a day in replicates of 2, for 20 days (n = 80 replicates per sample). The following results were obtained:

			Repeatability (Within-Run)		Within-Lab (Total Precision)	
Sample	**n**	**Mean (ng/dL)**	**SD**	**CV**	**SD**	**CV**
Control 1	80	257.38	9.06	3.5	14.38	5.6
Control 2	80	636.57	45.14	7.1	53.12	8.3
Control 3	80	1021.93	62.28	6.1	81.02	7.9
MDP1	80	20.92	1.3	6.2	1.86	8.9
MDP2	80	73.57	3.54	4.8	5.24	7.1
MDP3	80	312.81	13.4	4.3	23.99	7.7
MDP4	80	776.64	42.59	5.5	58.26	7.5
MDP5	80	1123.83	59.22	5.3	109.57	9.7
Female Patient Serum Pool	80	15.86	1.84	11.6	2.39	15.1

10.3 Linearity

A linearity study was performed using the modified device according to CLSI EP06-A using 9 serially diluted samples spanning the assay range. The mean was taken from each sample tested in duplicate. As presented below, the bias from the linear fit estimate was <10%.

Sample	Expected Dose (ng/dL)	Mean Observed Dose (ng/dL)	Weighted Linear Fit Estimate	Deviation from Linear Fit (Percentage)	Deviation From Linear Fit
1	6.94	6.94	6.95	-0.15	-0.01
2	11.65	11.95	11.68	2.33	0.27
3	16.35	18.84	16.40	14.88	2.44
4	110.00	102.03	110.39	-7.57	-8.35
5	213.06	228.35	213.82	6.79	14.53
6	419.18	430.72	420.69	2.38	10.03
7	831.42	819.33	834.43	-1.81	-15.10
8	1243.66	1317.80	1248.16	5.58	69.64
9	1655.90	1655.90	1661.90	-0.36	-6.00

The weighted linear regression equation is presented below.

Observed = 1.004(Expected) - 0.015 ng/dL

10.4 Method Comparison

A method comparison study was performed by comparing the Re-standardized ADVIA Centaur® Testosterone II (TSTII) to the ID-LC-MS/MS with 108 adult male and female serum samples distributed over the assay range (7.27-1394.00 ng/dL). The samples were assigned testosterone concentrations by the CDC HoSt RMP ID-LC/MS/MS. The study duration was 3 days using day 1 calibration and all samples run in singlicate. The analysis was performed

using Weighted Deming regression. The regression equation from the analysis is presented below.

Re-standardized ADVIA Centaur® Testosterone II (TSTII) (y) = 0.97 (x) (ID-LC-MS/MS)-0.22 ng/dL (r = 0.98)

For the re-standardized ADVIA Centaur® Testosterone II (TSTII) and the current ADVIA Centaur® Testosterone II (TSTII) method comparison study, an analysis was performed on a total of 108 individual male and female adult serum samples spanning the assay range (10.93-14.39.77 ng/dL) The analysis was performed using Weighted Deming regression. The regression equation from the analysis is presented below.

Re-standardized ADVIA Centaur® Testosterone II (TSTII) (y) = 1.04 (x) (ADVIA Centaur TSTII) - 4.14 ng/dL (r = 1.00)

A further method comparison study was performed by comparing the Re-standardized ADVIA Centaur® Testosterone II (TSTII) to the Dimension Vista LOCI Total Testosterone with 124 serum samples (79 samples from adults and 45 samples from pediatric subjects) ranging from 9.00–984.00 ng/dL (0.31–34.12 nmol/L). An analysis was also performed with the 45 samples from pediatric subjects (31 females, ages 7 years to 18 years; and 14 males, ages 22 months to 18 years) ranging from 11.00–762.00 ng/dL. The analyses were performed using Weighted Deming regression. The regression equations from the analyses are:

Adult and pediatric specimens

Re-standardized ADVIA Centaur® Testosterone II (TSTII) (y) = 1.01(x) (Dimension Vista TST) - 3.32 ng/dL (r = 0.99)

Pediatric specimens

Re-standardized ADVIA Centaur® Testosterone II (TSTII) (y) = 1.01(x) (Dimension Vista TST) - 4.74 ng/dL (r = 1.00)

10.5 Reference Intervals

Reference intervals for the ADVIA Centaur® Testosterone II (TSTII), ADVIA Centaur® SHBG and the Free Androgen Index (FAI) were obtained using samples from apparently healthy, normal adult females and males. The testosterone, SHBG, and FAI results provided in the tables below were obtained using results from the ADVIA Centaur® TSTII and ADVIA Centaur® SHBG. Central 90% reference intervals were established in accordance with the CLSI guideline EP28-A3c using a non-parametric approach for sample sizes of at least 120. For populations with a sample size of 40–119, the reference interval was calculated using an approach to accommodate the smaller sample size.

Central 90% reference intervals characterized by age and Tanner stage were established for the ADVIA Centaur® Testosterone II (TSTII) for a pediatric population (children and adolescents) in accordance with the CLSI guideline EP28-A3c using a non-parametric approach for sample sizes of at least 120. For populations with a sample size of < 120, the central 90% reference interval was calculated using an approach to accommodate the smaller sample size. Samples were collected prospectively from apparently healthy pediatric subjects (good
endocrinological health) using predefined inclusion criteria.

Samples were also clinically characterized according to Tanner Stage.

Testosterone

	TSTII	N	ng/dL Median	ng/dL Central 90th Ref Interval 5th	ng/dL Central 90th Ref Interval 95th	nmol/L Median	nmol/L Central 90th Ref Interval 5th	nmol/L Central 90th Ref Interval 95th
Adult Male	Under 50	250	409.72	197.44	669.58	14.22	6.85	23.23
	50 and Over	135	377.46	187.72	684.19	13.10	6.51	23.74
Adult Female	Under 50	224	18.01	8.38	35.01	0.62	0.29	1.21
	50 and Over	151	14.18	< 7.00	35.92	0.49	< 0.24	1.25
Pediatric Male	Tanner Stage 1	101	< 7.00	< 7.00	13.06	< 0.24	< 0.24	0.45
	Tanner Stage 2	78	< 7.00	< 7.00	79.13	< 0.24	< 0.24	2.75
	Tanner Stage 3	64	59.67	< 7.00	499.18	2.07	< 0.24	17.32
	Tanner Stage 4	88	376.84	79.10	747.17	13.08	2.74	25.93
	Tanner Stage 5	129	451.17	224.83	669.65	15.66	7.80	23.24
	Age 2-10	147	< 7.00	< 7.00	10.50	< 0.24	< 0.24	0.36
	Age 11	34	10.73	< 7.00	478.50	0.37	< 0.24	16.60
	Age 12	35	132.47	< 7.00	487.97	4.60	< 0.24	16.93
	Age 13	34	199.02	8.28	549.79	6.91	0.29	19.08
	Age 14	34	228.39	8.91	535.34	7.93	0.31	18.58
	Age 15	27	327.89	65.96	756.50	11.38	2.29	26.25
	Age 16-21	149	453.86	228.16	710.74	15.75	7.92	24.66
Pediatric Female	Tanner Stage 1	138	< 7.00	< 7.00	10.06	< 0.24	< 0.24	0.35
	Tanner Stage 2	60	8.17	< 7.00	30.11	0.28	< 0.24	1.04
	Tanner Stage 3	49	12.98	< 7.00	30.49	0.45	< 0.24	1.06
	Tanner Stage 4	98	17.37	< 7.00	35.19	0.60	< 0.24	1.22
	Tanner Stage 5	133	19.76	11.80	39.30	0.69	0.41	1.36
	Age 2-10	159	< 7.00	< 7.00	11.86	< 0.24	< 0.24	0.41
	Age 11-15	174	12.95	< 7.00	27.57	0.45	< 0.24	0.96
	Age 16-21	145	19.81	11.78	43.34	0.69	0.41	1.50

SHBG

	SHBG	N	µg/mL Median	µg/mL Central 90th Ref Interval 5th	µg/mL Central 90th Ref Interval 95th	nmol/L Median	nmol/L Central 90th Ref Interval 5th	nmol/L Central 90th Ref Interval 95th
Adult Male	Under 50	250	2.26	1.10	5.18	23.80	11.54	54.49
	50 and Over	135	3.51	1.65	6.79	36.91	17.33	71.50
Adult Female	Under 50	224	4.44	1.68	13.13	46.72	17.69	138.26
	50 and Over	151	4.55	2.25	10.51	47.86	23.65	110.61

FAI

	FAI	N	Percent (%) Median	Percent (%) Central 90th Ref Interval 5th	Percent (%) Central 90th Ref Interval 95th
Adult Male	Under 50	250	55.86%	26.18%	107.07%
	50 and Over	135	36.01%	17.38%	60.86%
Adult Female	Under 50	224	1.37%	0.33%	4.37%
	50 and Over	151	1.05%	0.31%	2.53%

10.6 Biotin Interference

Specimens that contain biotin at a concentration of 30 ng/mL demonstrate no significant effect on the assay. A summary of the results is presented below.

Analyte Concentration (ng/dL)	Biotin Test Level (ng/mL)						
	30	50	100	250	500	1200	1500
	% Bias						
83.27	4	6	23	84	370	3981	6837
289.24	2	7	19	107	441	>AR*	>AR*

* AR = Assay Range

11. Performance Characteristics: ADVIA Centaur® SHBG

The change in reference intervals in the Instructions for Use (Package Inserts) for the ADVIA Centaur® SHBG that was cleared in 2016 under 510(k) K151986 does not require the collection of additional analytical performance data. Therefore, all analytical performance data previously reviewed for the ADVIA Centaur® SHBG continues to apply to this assay, because the assay was not modified. These performance data are cross-referenced to the 510(k) submission for the ADVIA Centaur® SHBG (K151986 and K091867).

Specifically, the following studies are not needed for the purpose of this submission:

- Detection Capability (LoB, LoD, LoQ)
- Linearity
- Precision
- Dilution Recovery
- Method Comparison
- Calibrator/Assay Traceability
- Reagent On-Board Stability and Calibration Interval
- Cross reactivity
- Interfering substances
- Matrix Comparison
- Shelf Life Stability
- Onboard Stability
- Open Vial Stability

11.1 Clinical Studies

Not applicable.

11.2 Clinical Cut-off

Not applicable.

11.3 Biotin Interference

Specimens that contain biotin at a concentration of 300 ng/mL demonstrate a less than or equal to 10% change in results. A summary of the results is presented below.

Analyte Concentration (nmol/L)	Biotin Test Level (ng/mL)					
	38	75	150	300	600	1200
	% Bias					
19.6	-3	-3	-9	-7	-7	-25
44.1	-2	1	-3	-7	-9	-26

12. Conclusions

Based on the results of comparative testing, the re-standardized ADVIA Centaur® Testosterone II (TSTII) is substantially equivalent in principle and performance to the currently-marketed predicate device, the ADVIA Centaur® Testosterone II (TSTII) cleared under 510(k) K151986.

The ADVIA Centaur® SHBG with the new reference intervals in the Instructions for Use (package insert) is substantially equivalent to the currently marketed ADVIA Centaur® SHBG (K151986). The new reference intervals that will replace the current reference intervals in the Instructions for Use (Package Inserts) for the currently marketed assay do not require collection of additional analytical performance data.