Food and Drug Administration
10903 New Hampshire Avenue
Silver Spring, MD 20993-0002
www.fda.gov

510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY AND INSTRUMENT

I Background Information:

A 510(k) Number

K190298

B Applicant

Beckman Coulter Biomedical GmbH

C Proprietary and Established Names

DxA 5000
DxI 800 Access Immunoassay System
Access Ferritin
Access Folate
Access TSH (3rd IS)
Access Vitamin B12

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
CDD	Class II	21 CFR 862.1810 - Vitamin B12 Test System	CH - Clinical Chemistry
JMG	Class II	21 CFR 866.5340 - Ferritin immunological test system	IM - Immunology
CGN	Class II	21 CFR 862.1295 - Folic acid test system	CH - Clinical Chemistry
JLW	Class II	21 CFR 862.1690 - Thyroid stimulating hormone test system	CH - Clinical Chemistry

Product Code(s)	Classification	Regulation Section	Panel
JJE	Class I	21 CFR 862.2160 - Discrete photometric chemistry analyzer for clinical use	CH - Clinical Chemistry

II Submission/Device Overview:

A Purpose for Submission:

Addition of previously cleared Vitamin B12, Ferritin, Folate and TSH Access systems to a new laboratory automation system.

B Measurand:

Vitamin B12, Ferritin, Folate, and Thyroid stimulating hormone (TSH)

C Type of Test:

Quantitative Chemiluminescent Immunoassays

III Intended Use/Indications for Use:

A Intended Use(s):

See Indications for Use below.

B Indication(s) for Use:

The DxA 5000 is a high-speed, modular, automated sample handling system that performs pre-analytical and post-analytical sample processing and storage. The automation system also sorts, routes, and presents sample tubes to analyzers for analysis. The DxA 5000 also consolidates a variety of analytical instruments, such as an Immunoassay analyzer, into a unified workstation on a track system.

The UniCel DxI 800 Access Immunoassay System is a microcomputer controlled, random and continuous access analyzer that includes an external computer. This computer stores the system user interface (UI) software and allows the operator to interface with and direct the instrument software. The UniCel DxI 800 System uses enzyme immunoassays (utilizing paramagnetic particle solid phase and chemiluminescent detection) for the quantitative, semi-quantitative or qualitative determination of various analyte concentrations found in human body fluids. The UniCel DxI 800 System is an in vitro diagnostic device for use in the clinical laboratory.

The Access Ferritin assay is a paramagnetic particle, chemiluminescent assay for the quantitative determination of ferritin levels in human serum and plasma (heparin) using the Access Immunoassay Systems. Measurements of ferritin aid in the diagnosis of diseases affecting iron metabolism.

The Access Folate assay is a paramagnetic particle, chemiluminescent immunoassay for the quantitative determination of folic acid levels in human serum, plasma (heparin) and red blood cells using the Access Immunoassay Systems. Folic acid measurements are used in the diagnosis and treatment of megaloblastic anemia.

The Access Access TSH (3rd IS) assay is a paramagnetic particle, chemiluminescent assay for the quantitative determination of human thyroidstimulating hormone (thyrotropin, TSH, hTSH) levels in human serum using the Access Immunoassay Systems. Measurements of thyroid stimulating hormone produced by the anterior pituitary are used in the diagnosis of thyroid or pituitary disorders.

The Access Vitamin B12 assay is a paramagnetic particle, chemiluminescent assay for the quantitative determination of vitamin B12 in human serum and plasma (heparin) using Access Immunoassay Systems. Measurements obtained by this device are used in the diagnosis and treatment of anemias of gastrointestinal malabsorption.

C Special Conditions for Use Statement(s):

Rx - For Prescription Use Only

D Special Instrument Requirements:

DxA 5000 and Immunoassay analyzer, such as the UniCel DxI 800.

IV Device/System Characteristics:

A Device Description:

The DxA 5000 system is a high throughput automated sample handling system which can perform the pre and post analytical processing of sample tubes. DxA can identify and track samples, perform centrifugation, decapping, delivery of samples to connected analyzers, recapping, storing in either non-refrigerated or refrigerated storage, and sorting to output racks.

The DxA 5000 integrates preanalytic (pre and post analysis) functions with analytical instruments via a track system.

The UniCel DxI 800 Access Immunoassay System is a microcomputer controlled, random-access and continuous access instrument.

The Access Vitamin B12 Assay is a chemiluminescent immunoassay previously cleared for use on the Access Immunoassay Analyzer.

The Access TSH Assay is a chemiluminescent immunoassay previously cleared for use on the UniCel DxL 800 analyzer.

The Ferritin Access Assay is an immunoenzymatic assay previously cleared for use on Access Immunoassay Systems, including the UniCel DxI 800.

The Folate Access Assay is a chemiluminescent immunoassay previous cleared for use on Access Immunoassay Systems, including the UniCel DxI 800.

For a table of device characteristics, see "Comparison of Technology to Predicate Devices" below.

B Principle of Operation:

The Access TSH (3rd IS) assay is a two-site immunoenzymatic ("sandwich") assay. A sample is added to a reaction vessel with mouse anti-hTSH-alkaline phosphatase conjugate, buffered protein solution and paramagnetic particles coated with immobilized mouse monoclonal anti-hTSH antibody. The hTSH binds to the immobilized monoclonal anti-hTSH antibody on the solid phase while the mouse anti-hTSH-alkaline phosphatase conjugate reacts with a different antigenic site on the hTSH. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Then, the chemiluminescent substrate Lumi-Phos 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is directly proportional to the concentration of TSH in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve.

The Access Folate assay is a competitive binding receptor assay. For the assay of folate in serum or plasma (heparin), no pre-treatment is required. For the assay of folate in red blood cells, a whole blood sample is first treated off-line with a lysing agent composed of ascorbic acid. This pre-treatment hemolyzes the red blood cells and converts the folate polyglutamic acid forms present in red cells to the monoglutamic acid form predominant in serum. The sample from the pre-treatment of whole blood is defined as a hemolysate.

A serum, plasma (heparin), or hemolysate sample is treated to release folate from endogenous binding proteins. Folate binding protein, mouse anti-folate binding protein, folic acid-alkaline phosphatase conjugate, and goat anti-mouse capture antibody coupled to paramagnetic particles are added to the reaction vessel. Folate in the sample competes with the folic acid-alkaline phosphatase conjugate for binding sites on a limited amount of folate binding protein. Resulting complexes bind to the solid phase via mouse anti-folate binding protein. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away'. Then, a chemiluminescent substrate Lumi-Phos 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is inversely proportional to the concentration of folate in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve.

The Access Ferritin assay is a two-site immunoenzymatic ("sandwich") assay. A sample is added to a reaction vessel with goat anti-ferritin-alkaline phosphatase conjugate, and paramagnetic particles coated with goat anti-mouse: mouse anti-ferritin complexes. Serum or plasma (heparin) ferritin binds to the immobilized monoclonal anti-ferritin on the solid phase, while the goat anti-ferritin enzyme conjugate reacts with different antigenic sites on the ferritin molecules. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Then, the chemiluminescent substrate Lumi-Phos 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is directly proportional to the concentration of ferritin in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve.

The Access Vitamin B12 assay is a competitive-binding immunoenzymatic assay. A sample is added to a reaction vessel along with alkaline potassium cyanide and dithiothreitol. This treatment denatures B12 binding proteins and converts all forms of vitamin B12 to the cyanocobalamin form. After neutralization, intrinsic factor-alkaline phosphatase conjugate and paramagnetic particles coated with goat anti-mouse IgG: mouse monoclonal anti-intrinsic factor are added to the sample. Vitamin B12 in the sample binds to the intrinsic factor conjugate, preventing the conjugate from binding to the solid phase anti-intrinsic factor. Separation in a magnetic field and washing removes materials not bound to the solid phase. A chemiluminescent substrate, Lumi-Phos 530, is added to the reaction vessel and light generated by the reaction is measured with a luminometer. The light production is inversely proportional to the concentration of vitamin B12i n the sample. The amount of analyte in the sample is determined by means of a stored, mufti-point calibration curve.

C Instrument Description Information:

Modes of Operation	Yes	No
Does the applicant's device contain the ability to transmit data to a computer, webserver, or mobile device?	☒	☐
Does the applicant's device transmit data to a computer, webserver, or mobile device using wireless transmission?	☐	☒
Software		
FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types.	☒	☐

1. Instrument Name:

   DxA 5000

2. Specimen Identification:

   For evaluation of the barcode identification process performed by the DxA 5000 for the DTS analyzer, log files of the DxA 5000 lab automation system were investigated for 100, representative samples in terms of barcode transmission and consistency.

DxA 5000 log file analysis of 100 different, representative samples was used to confirm the correct functioning of the DTS barcode identification process by the DxA 5000.

3. Specimen Sampling and Handling:

   Sample handling instructions are provided in labeling.

4. Calibration:

   Calibration of the Vitamin B12, TSH, Ferritin, and Folate assays was established in k955436, k042281, k926221, and k060774, respectively.

5. Quality Control:

   Labeling recommends that at least two levels of an appropriate quality control material be tested a minimum of once a day. Labeling also recommends that quality control testing should be performed in accordance with laboratory accreditation requirements, applicable laws and good laboratory practices.

V Substantial Equivalence Information:

A Predicate Device Name(s):

Power Processor Sample Processing System With Generic Connections
Access Ferritin assay
Access Folate assay
Access HYPER sensitive hTSH assay
Access Vitamin B12 assay
UniCel DxI 800 Access Immunoassay System

B Predicate 510(k) Number(s):

K110413, K926221, K060774, K042281, K955436, K023764

C Comparison with Predicate(s):

Device & Predicate Device(s):	K190298	K110413
Device Trade Name	DxA 5000 System	Power Processor Sample Processing System with Generic Connections
General Device Characteristic Similarities		
Intended Use/Indications For Use	Same	Automated sample handling, routing, and management system
Technology	Same	Centralized operation and monitoring of decentralized equipment.
Sample Transfer Method	Same	Onboard sampling is the physical transfer of the sample

Device & Predicate Device(s):	K190298	K110413
		tube/rack from the automation track to the analyzer's sample load and identification area. Outboard sampling capability reads the barcode for the analyzer and signals the analyzer's existing LAS communications interface to perform direct track sampling.
Sample Identification		Identification of patient tubes and sample programming using bar codes.
General Device Characteristic Differences		
Throughput	Up 1200 tubes per hour	450 tubes per hour
Volume Detection Method	Laser- Liquid Level Detection	Combination of infrared sensor and pressure sensor

Device & Predicate Device(s):	K190298	K955436
Device Trade Name	Access Vitamin B12	Access Vitamin B12
General Device Characteristic Similarities		
Intended Use/Indications For Use	Same	For the quantitative determination of vitamin B12 levels in human serum and plasma.
General Device Characteristic Differences		
Lab Automation System	DxA 5000 System	None

Device & Predicate Device(s):	K190298	K042281
Device Trade Name	Access TSH (3rd IS)	HYPER sensitive hTSH assay
General Device Characteristic Similarities		
Intended Use/Indications For Use	Same	For the quantitative determination of human thyroid-stimulating hormone (thyrotropin, TSH, hTSH) levels in human serum and plasma

General Device Characteristic Differences		
Lab Automation System	DxA 5000 System	None

Device & Predicate Device(s):	K190298	K926221
Device Trade Name	Access Ferritin	Access Ferritin
General Device Characteristic Similarities		
Intended Use/Indications For Use	Same	For the quantitative determination of ferritin levels in human serum and plasma
General Device Characteristic Differences		
Lab Automation System	DxA 5000 System	None

Device & Predicate Device(s):	K190298	K060774
Device Trade Name	Access Folate	Access Folate
General Device Characteristic Similarities		
Intended Use/Indications For Use	Same	For the quantitative determination of folic acid levels in human serum and plasma
General Device Characteristic Differences		
Lab Automation System	DxA 5000 System	None

VI Standards/Guidance Documents Referenced:

None.

VII Performance Characteristics (if/when applicable):

A Analytical Performance:

1. Precision/Reproducibility:

The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, precision for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the precision of these assays.

2. Linearity:

   The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, linearity for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the linearity of these assays.

3. Analytical Specificity/Interference:

   The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, specificity for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the specificity of these assays.

4. Assay Reportable Range:

   The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, the reportable range for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the reportable range of these assays.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

   The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, the traceability, stability, and expected values for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the traceability, stability, and expected values of these assays.

6. Detection Limit:

   The sponsor stated that the reagents for the Vitamin B12, TSH, Ferritin, and Folate assays are unchanged in this submission. Therefore, detection limits for these assays, as reviewed in k955436, k042281, k926221, and k060774, respectively, is adequate to describe the detection limits of these assays.

7. Assay Cut-Off:

   Not applicable.

8. Accuracy (Instrument):

   For information describing the accuracy of the Unicel DxI 800 Access Immunoassay System, see k023764.

9. Carry-Over:

   Not Applicable.

B Comparison Studies:

1. Method Comparison with Predicate Device:

   For comparing the pre-analytical processing of the DxA 5000 to the Power Processor, native samples were evaluated using both the DxA 5000 and the Power processor in conjunction with four representative assays (Ferritin, Folate, TSH, and Vitamin B12).

   The paired data sets were obtained by collecting blood into two sample tubes per patient. One sample tube was processed pre-analytically by the Power Processor being analyzed by the DxI800 Access Immunoanalyzer connected to the Power Processor. The other sample tube was processed pre-analytically by the DxA 5000 being analyzed by the DxI 800 Access Immunoanalyzer connected to the DxA 5000. This study and results are shown in the table below:

Analyte	Ferritin	Folate	TSH	Vitamin B12
Sample Type	Plasma	Plasma	Plasma	Plasma
N	111	104	96	114
Sample Range (predicate)	4.06-1046.73	2.71-19.8	0.019-22.875	125.89-1337.67
Units	ng/mL	ng/mL	mIU/L	pg/mL
Slope (95% CI)	1.003 (0.9649; 1.031)	0.988 (0.934; 1.040)	0.9682 (0.9435; 0.9922)	0.974 (0.918; 1.025)
Intercept (95% CI)	0.776 (-0.051; 2.314)	0.215 (-0.130; 0.510)	-0.020 (-0.055; 0.000)	-21.850 (-36.495; -1.917)
R	0.995	0.981	0.999	0.983

   These results adequately demonstrate that the performance of the DxA 5000 is comparable to that of the predicate device.

2. Matrix Comparison:

   Not Applicable.

C Clinical Studies:

1. Clinical Sensitivity:

   Not Applicable.

2. Clinical Specificity:

   Not Applicable.

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

   Not Applicable.

D Clinical Cut-Off:

Not Applicable.

E Expected Values/Reference Range:

For information describing the expected values for Vitamin B12, TSH, Ferritin, and Folate assays, see k955436, k042281, k926221, and k060774, respectively.

F Other Supportive Instrument Performance Characteristics Data:
Not Applicable.

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

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