March 21, 2019

Beckman Coulter
Anthony Dennis
Sr. Manager
11800 SW 147th Ave.
Miami, Florida 33196-2500

Re: K183592
Trade/Device Name: ClearLLab 10C Panels (B, T, M1, M2), Navios Flow Cytometer, Navios EX Flow Cytometer
Regulation Number: 21 CFR 864.7010
Regulation Name: Flow cytometric test system for hematopoietic neoplasms
Regulatory Class: Class II
Product Code: PWD, OYE
Dated: December 20, 2018
Received: December 21, 2018

Dear Anthony Dennis:

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/CombinationProducts/GuidanceRegulatoryInformation/ucm597488.htm); 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 http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/) and CDRH Learn (http://www.fda.gov/Training/CDRHLearn). 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 (http://www.fda.gov/DICE) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Douglas A. Jeffery -S

Doug Jeffery
Acting Deputy Director
Division of Immunology
and Hematology Devices
Office of In Vitro Diagnostics
and Radiological Health
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)*
K183592

Device Name
ClearLLab 10C Panels (B, T, M1, M2)

Indications for Use *(Describe)*
The ClearLLab 10C Panels are intended for in vitro diagnostic use for qualitative identification of cell populations by multiparameter immunophenotyping on the Navios and Navios EX flow cytometers. These reagents are used as an aid in the differential diagnosis of hematologically abnormal patients having, or suspected of having, the following hematopoietic neoplasms: chronic leukemia, acute leukemia, non-Hodgkin lymphoma, myeloma, myelodysplastic syndrome (MDS), and/or myeloproliferative neoplasms (MPN). The reagents can be used with peripheral whole blood (collected in K2EDTA, Acid Citrate Dextrose (ACD) or Heparin), bone marrow (collected in K2EDTA, ACD or Heparin) and lymph node specimens. Interpretation of the results should be confirmed by a pathologist or equivalent professional in conjunction with other clinical and laboratory findings.
These reagents provide multiparameter, qualitative results for the surface antigens listed below:
• ClearLLab 10C B Cell Tube: Kappa, Lambda, CD10, CD5, CD200, CD34, CD38, CD20, CD19, CD45
• ClearLLab 10C T Cell Tube: TCRγδ, CD4, CD2, CD56, CD5, CD34, CD3, CD8, CD7, CD45
• ClearLLab 10C M1 Cell Tube: CD16, CD7, CD10, CD13, CD64, CD34, CD14, HLA-DR, CD11b, CD45
• ClearLLab 10C M2 Cell Tube: CD15, CD123, CD117, CD13, CD33, CD34, CD38, HLA-DR, CD19, CD45

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.

DO NOT SEND YOUR COMPLETED FORM TO THE PRA STAFF EMAIL ADDRESS BELOW.

The burden time for this collection of information is estimated to average 79 hours per response, including the time to review instructions, search existing data sources, gather and maintain the data needed and complete and review the collection of information. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden, to:

Department of Health and Human Services
Food and Drug Administration
Office of Chief Information Officer
Paperwork Reduction Act (PRA) Staff
PRAStaff@fda.hhs.gov

"An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB number."

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)*
K183592

Device Name
Navios Flow Cytometer

Indications for Use *(Describe)*
The Navios Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm, and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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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)*
K183592

Device Name
Navios EX Flow Cytometer

Indications for Use *(Describe)*
The Navios EX Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm, and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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Section 5	510(k) Summary

510(k) Summary for
ClearLLab 10C Reagents

510(k) Owner / Submitter Information

Name: Beckman Coulter Inc.
Address: 11800 SW 147th Ave., Miami, FL 33196
Phone #: (305) 380-4509
Fax #: (305) 380-4344
Contact Person: Anthony Dennis
Email Address: adennis@beckman.com
Date Submitted: 12 December 2018

Device Information

Trade Name: **ClearLLab 10C (T), ClearLLab 10C (B), ClearLLab 10C (M1), ClearLLab (M2)**
Common Name: ClearLLab Reagents
Classification Name: Flow Cytometric Test System for Hematopoietic Neoplasms (21 CFR 864.7010)
Classification: Class II
Product Code: PWD
Panel: Hematology

Trade Name: **Navios Flow Cytometer**
Common Name: Navios Flow Cytometer
Classification Name: Automated differential cell counter (21 CFR 864.5220)
Classification: Class II
Product Code: OYE
Panel: Hematology

Trade Name: **Navios EX Flow Cytometer**
Common Name: Navios EX Flow Cytometer
Classification Name: Automated differential cell counter (21 CFR 864.5220)
Classification: Class II
Product Code: OYE
Panel: Hematology

Predicate Device Information

Predicate Product	510(k) Number	Date Cleared	Classification	21 CFR	Product Code
ClearLLab Reagents	DEN160047	06/29/2017	Class II	864.7010	PWD
Navios Flow Cytometer	K130373	9/18/2013	Class II	864.5220	OYE
Navios EX Flow Cytometer	K162897	6/23/2017	Class II	864.5220	OYE

Device Description

The new ClearLLab 10C reagent system is comprised of various components and is described below. Figures 2 and 3 illustrate the anticipated workflow from instrument setup through data analysis with a breakout of the standardization and Quality Control sequence for the new reagent system. As the figures show, the process is in-line with standard flow cytometry protocol.

- Four ClearLLab 10C Panels [B, T, M1 and M2]
- Navios and Navios EX flow cytometers [3 laser/10 color configurations]
- ClearLLab Compensation Kit
- ClearLLab Compensation Beads
- ClearLLab Control Cells, normal and abnormal
- Kaluza C data analysis software
- Flow-Check Pro Fluorospheres
- Flow-Set Pro Fluorospheres
- IOTest 3 Fixative Solution
- IOTest 3 Lysing Solution

The ClearLLab 10C reagent system is run on Beckman Coulter's Navios or Navios EX flow cytometer (3 Laser/10 Color configurations]. It requires off-line manual sample processing and use of the accompanying lysing reagent. As part of the ClearLLab 10C reagent system, to allow proper utilization of this application, the indications for the Navios and Navios EX flow cytometers include all ten fluorescent detection channels and three laser configurations (blue, red and violet).

LMD data analysis is performed manually using the Kaluza C Analysis Software. This Analysis Software package is supplied separately from the Navios and Navios EX system softwares and must be installed on an independent computer workstation for off-line analysis of listmode files generated on the flow cytometer with the associated reagents and cytometer system software package, including Control Cell QC data and sample data analysis. The Navios and Navios EX analysis software are NOT be recommended for use with this application (Note that QC data from Flow-Set Pro, Flow-Check Pro, and Compensation products will continue to be analyzed using the on-board instrument software).

Kaluza C Software is a software tool designed to work with *.fcs and *.lmd files generated from flow cytometers.

Preset Kaluza C analysis templates for the ClearLLab 10c reagent system are provided.

Intended Use:

ClearLLab 10C Reagents

The ClearLLab 10C Panels are intended for in vitro diagnostic use for qualitative identification of cell populations by multiparameter immunophenotyping on the Navios and Navios EX flow cytometers. These reagents are used as an aid in the differential diagnosis of hematologically abnormal patients having, or suspected of having, the following hematopoietic neoplasms: chronic leukemia, acute leukemia, non-Hodgkin lymphoma, myeloma, myelodysplastic syndrome (MDS), and/or myeloproliferative neoplasms (MPN). The reagents can be used with peripheral whole blood (collected in K_2EDTA, Acid Citrate Dextrose (ACD) or Heparin), bone marrow (collected in K_2EDTA, ACD or Heparin) and lymph node specimens. Interpretation of the results should be confirmed by a pathologist or equivalent professional in conjunction with other clinical and laboratory findings.

These reagents provide multiparameter, qualitative results for the surface antigens listed below:

- ClearLLab 10C B Cell Tube: Kappa, Lambda, CD10, CD5, CD200, CD34, CD38, CD20, CD19, CD45
- ClearLLab 10C T Cell Tube: TCRγδ, CD4, CD2, CD56, CD5, CD34, CD3, CD8, CD7, CD45
- ClearLLab 10C M1 Cell Tube: CD16, CD7, CD10, CD13, CD64, CD34, CD14, HLA-DR, CD11b, CD45
- ClearLLab 10C M2 Cell Tube: CD15, CD123, CD117, CD13, CD33, CD34, CD38, HLA-DR, CD19, CD45

Navios Flow Cytometer

The Navios Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm, and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.

Navios EX Flow Cytometer

The Navios EX Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm, and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.

Technological Characteristics Comparisons to Predicate

Table 1: Similarities of Features/Characteristics between the Predicate and Subject Device

Characteristic	New ClearLLab 10C Reagent System Subject Device	Predicate ClearLLab Reagents (5-color) (De Novo DEN160047)
FDA product code	PWD (based on *De Novo* submission DEN160047)	PWD
Intended Use	*In vitro* diagnostic device for immunophenotyping	*In vitro* diagnostic device for immunophenotyping
Indications for Use	SAME (with the exception of cytometer and clarifying language) Intended for in vitro diagnostic use as a panel for qualitative identification of cell populations by multiparameter immunophenotyping on the Navios and Navios EX flow cytometers. These reagents are used as an aid in the differential diagnosis of hematologically abnormal patients having the following hematopoietic neoplasms: chronic leukemia, acute leukemia, non-Hodgkin lymphoma, myeloma, myelodysplastic syndrome (MDS), and/or myeloproliferative neoplasms (MPN). The reagents can be used with peripheral whole blood (collected in K_2EDTA, ACD or Heparin), bone marrow (collected in K_2EDTA, ACD or Heparin) and lymph node specimens for immunophenotyping. Interpretation of the results should be confirmed by a pathologist or equivalent in conjunction with other clinical and laboratory findings.	Intended for in vitro diagnostic use as a panel for qualitative identification of cell populations by immunophenotyping on an FC 500 flow cytometer. These reagents are used as an aid in the differential diagnosis of hematologically abnormal patients having the following hematopoietic neoplasms: chronic leukemia, acute leukemia, non-Hodgkin lymphoma, myeloma, myelodysplastic syndrome (MDS), and/or myeloproliferative neoplasms (MPN). The reagents can be used with peripheral whole blood (collected in K_2EDTA, ACD or Heparin), bone marrow (collected in K_2EDTA, ACD or Heparin) and lymph node specimens for immunophenotyping. The results should be interpreted by a pathologist or equivalent in conjunction with other clinical and laboratory findings.
Reagent Panels	BOLDED MARKERS ARE THE SAME	

B panel	T panel	M1 panel	M2 panel	B1 panel	B2 panel	T1 panel	T2 panel	M panel
KAPPA	TCRγδ	CD16	CD15	**CD2**	**CD8**	**KAPPA**	**CD20**	**CD7**
LAMBDA	**CD4**	**CD7**	CD123	**CD56**	**CD4**	**LAMBDA**	**CD10**	**CD13**
CD10	**CD2**	**CD10**	CD117	**CD7**		**CD19**	**CD19**	**CD34**

Characteristic	New ClearLLab 10C Reagent System Subject Device				Predicate ClearLLab Reagents (5-color) (De Novo DEN160047)				
	CD5	**CD56**	**CD13**	**CD13**	**CD5**	**CD3**	**CD5**	**CD38**	**CD33**
	CD200	**CD5**	CD64	**CD33**	**CD45**	**CD45**	**CD45**	**CD45**	**CD4**
	CD34	**CD34**	**CD34**	**CD34**					
	CD38	**CD7**	CD14	**CD38**					
	CD20	**CD8**	HLA-DR	HLA-DR					
	CD19	**CD3**	CD11b	**CD19**					
	CD45	**CD45**	**CD45**	**CD45**					
Reagent Form	Dry unitized form (one test / panel)				Liquid form				
Storage Conditions	18-30°C				2-8°C				
Set-up Reagents *Standardization*	SIMILAR Flow-Set Pro Fluorospheres: Same function, but expanded to allow use on all 10 channels of the Navios and Navios EX				Flow-Set Pro Fluorospheres				
Optical alignment and fluidics	SIMILAR Flow-Check Pro Fluorospheres: Same function, but expanded to allow use on all 10 channels of the Navios and Navios EX				Flow-Check Pro Fluorospheres				
Lyse and Fixation	SIMILAR, EXISTING IOTest 3 Fixative Solution IOTest 3 Lysing Solution				IOTest 3 Fixative Solution VersaLyse Lysing Solution				
Sample Preparation	SIMILAR Wash and prepare samples manually				Wash and prepare samples manually				
Reagents for Color Compensation *ClearLLab Compensation Kit and ClearLLab Compensation Beads*	NEW ClearLLab Compensation Kit with ClearLLab Compensation Beads: the Compensation Kit includes dry reagents used to set color compensation settings. The kit contains 10 tubes of a single color reagent per use, each containing a single antibody conjugated to a specific fluorochrome. The Compensation Beads are positive and negative microspheres				CD45-FITC, CD45-PE and CD45-ECD from existing QuickComp 4 plus CD45-PC5.5 and CD45-PC7				

Characteristic	New ClearLLab 10C Reagent System Subject Device	Predicate ClearLLab Reagents (5-color) (De Novo DEN160047)
	that can be used to set compensation in conjunction with the Compensation Kit.	

Table 2: Similarities and differences between Navios and its predicate

Attribute	Navios Flow Cytometer K130373	Subject Navios Flow Cytometer
FDA product code	OYE	OYE
Indications for Use	The Navios Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping. It can be used in conjunction with the following monoclonal antibody reagents and software package: • CYTO-STAT tetraCHROME CD45-FITC/CD4-RD1/CD8-ECD/CD3-PC5 and CYTO-STATE tetraCHROME CD45-FITC/CD56-RD1/CD19-ECD/CD3-PCD5 monoclonal antibody reagents. These reagents provide identification and enumeration of CD3+CD4+, CD3+CD8+, CD3+, CD19+ and CD3-CD56+ lymphocyte percentages and absolute counts in peripheral whole blood. Absolute counts may be determined by the Navios flow cytometer using Flow-Count Fluorospheres (single platform technology method) or separate hematology results (dual platform method). These reagents are indicated for use in the immunologic assessment of patients having or suspected of having immune deficiency. • Navios tetra Software for automated analysis and results with CYTO-STAT tetraCHROME CD45-FITC/CD4-RD1/CD8-ECD/CD3-PC5 and CYTO-STAT tetraCHROME CD45-FITC/CD56-RD1/CD19-ECD/CD3-PC5 monoclonal antibody reagents. Navios Software may be installed on an independent computer workstation for off-line analysis of listmode files generated by the Navios Flow Cytometer with the monoclonal antibody reagents and software package listed above. The off-line analysis must be performed in accordance with the product labeling.	The Navios Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.
Safety Features	Interlocks and mitigation of hazards via software and hardware controls	Same

Attribute	Navios Flow Cytometer K130373	Subject Navios Flow Cytometer
Pre-Analytic Features		
System Configuration	• Bench top • Printer • PC based workstation running Microsoft Windows Vista or WIN7 application specific software	Same (the 10C application is for WIN7 only)
Sample Preparation with Monoclonal Antibodies	Off-board sample preparation following instructions provided with cleared antibody reagent	Same
Sample Presentation	Prepared sample added to a daughter tube	Same
Sample Aspiration Probe	Fixed height	Same
Resuspension of prepared sample prior to introduction to system	Prepared sample is vortex mixed	Same
Sample Introduction	Tube sampler • Automated presentation with Multi-tube Carousel Loader (MCL) from 32 test tube capacity carousel • Manual presentation into a tube location on a MCL via tube access door	Same
Aspiration Pathway	Same aspiration pathway used for automated and manual presentation	Same
Sample Identification	Bar-code reading of carousel position and labeled sample tube. User may also identify samples based on carousel location with a worklist.	Same
Analytical Features		
Lasers / Driver Boards	Blue (488 nm), 22mW Red (638 nm), 25mW Violet (405 nm), 40mW	Same

Attribute	Navios Flow Cytometer K130373	Subject Navios Flow Cytometer
Maximum Parameter Detectors	Twelve (FS, SS, FL1 – FL10)	Same
Electronics	40 MHz sampling Digital integrator circuitry w/ early stage ADC	Same
Photomultiplier Tubes (PMTs) / Colors	Standard 5 PMTs (FL1 – FL5) off of 488 nm laser (blue)	Same; 10C application will require expansion to all 10 PMTs: Standard 3 PMTs (FL6 – FL8) off of 638 nm laser (red) Standard 2 PMTs (FL9 – FL10) off of 405 nm laser (violet)
Color Separation	Collimated beam is separated into desired components with dichroic filters.	Same
On-board acquisition software	System Software available	Same
Post-Analytical Features		
Data Reporting	FlowPAGE, Panel Report, Plots and Statistics printouts	Same
Cleaning Cycle Between Samples	Executed with IsoFlow Sheath Fluid ensuring carryover specification is met	Same
Quality Control Techniques	• Daily Instrument Checks • Supplied Controls for ClearLLab 10C application • Inter-laboratory Quality Assurance Program (IQAP)	Same
Cleanse Cycle	Cleaning cycle performed with FlowClean cleaning reagent as part of the daily shutdown process, before and after running samples with vital dyes that stain the tubing, and as part of troubleshooting.	Same
Compensation and Sample Preparation Reagents		
Reagents used for compensation and sample preparation	QuickComp 4	ClearLLab Compensation Kit and Compensation Beads with the new ClearLLab 10C application.
Controls and Calibrators		
Assay Controls and Calibrators	Flow-Check Pro Fluorospheres Flow-Set Pro Fluorospheres	Same Same function, but expanded to allow use on all 10 channels
Process Controls	Immuno-Trol and Immuno-Trol Low	ClearLLab Control Cells (Normal and Abnormal) with the ClearLLab 10C application.

Table 3: Similarities and differences between Navios EX and its predicate

Attribute	Navios EX Flow Cytometer K162897	Subject Navios EX Flow Cytometer
Product Code	OYE	OYE
Indications for Use	The Navios EX Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to four fluorescent detection channels using a blue (488 nm) laser and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.	The Navios EX Flow Cytometer is intended for use as an in vitro diagnostic device for immunophenotyping using up to ten fluorescent detection channels using three lasers (488 nm, 638 nm and 405 nm) and two light scatter detection channels. It is intended for use with in vitro diagnostic (IVD) assays and software that are indicated for use with the instrument.
Safety Features	Interlocks and mitigation of hazards via software and hardware controls	Same
Pre-Analytic Features		
System Configuration	• Bench top • Printer • PC based workstation running Microsoft WIN7 application specific software	Same
Sample Preparation with Monoclonal Antibodies	Off-board sample preparation following instructions provided with cleared antibody reagent	Same
Sample Presentation	Prepared sample added to a daughter tube	Same
Sample Aspiration Probe	Fixed height	Same
Resuspension of prepared sample prior to introduction to system	Prepared sample is vortex mixed	Same
Sample Introduction	Tube sampler • Automated presentation with Multi-tube Carousel Loader (MCL) from 32 test tube capacity carousel • Manual presentation into a tube location on a MCL via tube access door	Same
Aspiration Pathway	Same aspiration pathway used for automated and manual presentation	Same

Attribute	Navios EX Flow Cytometer K162897	Subject Navios EX Flow Cytometer
Sample Identification	Bar-code reading of carousel position and labeled sample tube. User may also identify samples based on carousel location with a worklist.	Same
Analytical Features		
Lasers / Driver Boards	Blue (488 nm), 55mW Red (638 nm), 50 mW Violet (405 nm), 80 mW	Same
Maximum Parameter Detectors	Twelve (FS, SS, FL1 – FL10)	Same
Electronics	40 MHz sampling Digital integrator circuitry w/ early stage ADC	Same
Photomultiplier Tubes (PMTs) / Colors	Standard 5 PMTs (FL1 – FL5) off of 488 nm laser (blue)	Same; 10C application will require expansion to all 10 PMTs: Standard 3 PMTs (FL6 – FL8) off of 638 nm laser (red) Standard 2 PMTs (FL9 – FL10) off of 405 nm laser (violet)
Color Separation	Collimated beam is separated into desired components with dichroic filters.	Same
On-board acquisition software	System Software available	Same
Post-Analytical Features		
Data Reporting	FlowPAGE, Panel Report, Plots and Statistics printouts	Same
Cleaning Cycle Between Samples	Executed with IsoFlow Sheath Fluid ensuring carryover specification is met	Same
Quality Control Techniques	• Daily Instrument Checks • Supplied Controls for ClearLLab 10C application • Inter-laboratory Quality Assurance Program (IQAP)	Same
Cleanse Cycle	Cleaning cycle performed with FlowClean cleaning reagent as part of the daily shutdown process, before and after running samples with vital dyes that stain the tubing, and as part of troubleshooting.	Same
Compensation and Sample Preparation Reagents		

Attribute	Navios EX Flow Cytometer K162897	Subject Navios EX Flow Cytometer
Reagents used for compensation and sample preparation	QuickComp 4	ClearLLab Compensation Kit and Compensation Beads with the new ClearLLab 10C application.
Controls and Calibrators		
Assay Controls and Calibrators	Flow-Check Pro Fluorospheres Flow-Set Pro Fluorospheres	Same Same function, but expanded to allow use on all 10 channels
Process Controls	Immuno-Trol and Immuno-Trol Low	ClearLLab Control Cells (Normal and Abnormal) with the ClearLLab 10C application.

Summary of Instrument Characterization and Analytical Performance Testing

Study	Testing Approach	FDA Guidance Documents	Standards/ References	Testing Results
Laser Performance Characteristics	Verify stability of the laser performance of the Navios and Navios EX flow cytometer over time.	None	None	Analysis of the data collected demonstrates that the Navios and Navios EX laser performance is stable over time.
Instrument Carryover	To verify carryover using Flow-Check Pro fluorospheres meets performance specifications.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Carryover (Section 12)	CLSI H26-A2; FDA Standards Recognition #7-210	Analysis of the data collected demonstrates that the Navios and Navios EX meet the carryover performance requirements.
Instrument Linearity	Verify fluorescence detection is linear using standard Navios and Navios EX settings.	None	None	Linearity of fluorescence measurements was demonstrated.
Navios vs. Navios EX Percent Cell Recovery Equivalence Study	Demonstrate the equivalent performance in % cell recovery between Navios and Navios EX flow cytometers when running ClearLLab 10C application.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Accuracy (Section 8)	CLSI EP09-A3, Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline	Analysis of the data collected demonstrates that the Navios and Navios EX Flow Cytometry Systems are equivalence when running the ClearLLab 10C application.

Summary of ClearLLab 10C Reagents (T, B, M1, M2) Performance Testing:

Study	Objective	FDA Guidance Documents	Standards/ References	Testing Results
Characterization	Demonstrate antibody specificity including Fluorescence Minus One	None	None	Analysis of the data collected demonstrates that specific antibody clones and polyclonal antibody reagents are identified for ClearLLab 10C reagent panel markers.
Characterization	Titrate for optimal reagent dosage	None	None	Analysis of the data collected demonstrates that antibody conjugates dosing values are determined for was defined for each antibody of ClearLLab 10C reagents.
Characterization	Assess of Non-Specific Binding	None	None	Analysis of the data collected demonstrates solutions implemented to reduce and/or obtain acceptable level of non-specific binding.
Lot-to-Lot Reproducibility	Demonstrate variability of multiple lots of material.	None	CLSI EP5-A3, Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline – Third Edition. FDA Standards Recognition #7-251	Analysis of the data collected demonstrates that the ClearLLab 10C panels have acceptable lot variability performance.
Stability	Demonstrate reagent stability.	None	CLSI EP25-A – Evaluation of Stability of In Vitro Diagnostic Reagents. Approved Guideline	Analysis of the data collected demonstrates that the ClearLLab 10C panels met performance requirements in support of the product's stability claims.
Carryover – Specimen and Reagent	To verify carryover of specimen and reagents on the Navios and Navios EX meets performance specifications.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Carryover (Section 12)	Validation, Verification, and Quality Assurance of Automated Hematology Analyzers, Approved Standard - 2nd Edition; June 2010; CLSI H26-A2; FDA Standards Recognition #7-210	Analysis of the data collected demonstrates that the Navios and Navios EX meets carryover performance requirements.
Bulk vs. Single Wash	Demonstrate equivalency of sample preparation methods.	None	CLSI EP09-A3, Measurement Procedure Comparison and Bias	Equivalency of single tube wash and bulk wash methodology was demonstrated.

Study	Objective	FDA Guidance Documents	Standards/ References	Testing Results
			Estimation Using Patient Samples; Approved Guideline	
Detection Capability	To verify that the ClearLLab 10C panels with the Navios or Navios EX meet the performance requirements for the ability to differentiate between abnormal and normal populations.	None	Wood B et al. Validation of Cell-Based Fluorescence Assays: Practice Guidelines from the ICSH and ICCS – Part V - Assay performance Criteria. Cytometry Part B (Clinical Cytometry), pp. 315-323	Analysis of the data collected demonstrates that the ClearLLab 10C panels with the Navios or Navios EX meet the performance requirements for Detection Capability.
Specimen Age and Prepared Sample Stability (Whole Blood and Bone Marrow)	Verify whole blood and bone marrow specimen and prepared sample stability claims.	None	None	Analysis of the data collected demonstrates that the ClearLLab 10C panels meet the requirements for specimen and prepared sample stability (Whole Blood and Bone Marrow).
Specimen Age and Prepared Sample Stability (Lymph Node)	Verify lymph node samples prepared sample stability claim.	None	None	Analysis of the data collected demonstrates that the ClearLLab 10C panels meet the requirements for prepared sample stability (Lymph Node).
Anticoagulant Equivalency – Whole Blood	Demonstrate equivalent performance of whole blood specimens collected in several different anticoagulants (K_2EDTA, Heparin and ACD) on the Navios system using ClearLLab 10C panels.	None	CLSI EP09-A3, Measurement Procedure Comparison and Bias Estimation Using Patient Samples; Approved Guideline--Third Edition	Performance of ClearLLab 10C panels with whole blood specimens collected in K_2EDTA, Heparin and ACD anticoagulants was demonstrated to be equivalent.
Anticoagulant Method Comparison – 10C to 5C	Demonstrate equivalency of anticoagulants used with bone marrow and whole blood specimens with the ClearLLab 10C panels in reference to the ClearLLab 5 color reagents.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Accuracy (Section 8)	User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline – Second Edition; CLSI EP12-A2; FDA Standards Recognition #7-152	For all conditions evaluated, the data collected demonstrates that the various anticoagulants are equivalent.

Study	Objective	FDA Guidance Documents	Standards/ References	Testing Results
Precision – Control Material	Demonstrate system imprecision using control material as a surrogate for a stabilized sample	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Precision (Section 9)	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251	Analysis of the data collected demonstrates that the ClearLLab 10C panels meet performance requirements for repeatability and reproducibility.
Precision – Multi-Site with Clinical Specimens	Demonstrate assay repeatability and reproducibility using both normal and clinical specimens.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Precision (Section 9)	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251 User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline – Second Edition; CLSI EP12-A2; FDA Standards Recognition #7-152	Analysis of the data collected demonstrates that the ClearLLab 10C panels meet performance requirements for repeatability and reproducibility.
Precision – Operator and Instrument Variability	Demonstrate system imprecision performance of the ClearLLab 10C panels using the same specimen prepared by three (3) operators, twice a day, on two (2) Navios EX flow cytometers.	Special Controls Guidance Document: Premarket Notifications for Automated Differential Cell Counters for Immature or Abnormal Blood Cells - Precision (Section 9)	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251 User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline – Second Edition; CLSI EP12-A2; FDA Standards Recognition #7-152	The ClearLLab 10C panels when run on each specimen type by different operators on different Navios EX flow cytometers demonstrated acceptable precision performance and met acceptance criteria.
Clinical Accuracy	Evaluate the clinical accuracy of the ClearLLab 10C Panels in identifying an abnormal or normal phenotype vs. the	None	CLSI H43-A2: Clinical Flow Cytometric Analysis of Neoplastic Hematolymphoid Cells – Second	Analysis of the data collected demonstrates that the ClearLLab 10C panels are able

Study	Objective	FDA Guidance Documents	Standards/ References	Testing Results
	site's clinical diagnosis of malignant or non-malignant outcome from the current standard of care		Edition; FDA Standards Recognition #7-150 User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline – Second Edition; CLSI EP12-A2; FDA Standards Recognition #7-152 CLSI EP24-A2: Assessment of the Diagnostic Accuracy of Laboratory Tets Using Receiver Operating Characteristic Curves; Approved Guideline – Second Edition; FDA Standards Recognition #7-234	identify the abnormal population when compared to clinical outcome.

Summary of Accessory Reagents Performance Testing:

Study	Objective	FDA Guidance Documents	Standards/ References	Testing Results
IOTest 3 Fixative and IOTest 3 Lysing Solution – Lot-to-Lot Reproducibility	Demonstrate variability of multiple lots of material.	None	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251	Analysis of the data collected demonstrates that the IOTest 3 Fixative and Lysing Solutions have acceptable lot variability performance.
Flow-Set Pro Lot-to-Lot Variability	Demonstrate variability of multiple lots of material.	None	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251	Analysis of the data collected demonstrates that the Flow-Set Pro have acceptable lot variability performance.
Flow-Check Pro Lot-to-Lot Variability	Demonstrate variability of multiple lots of material.	None	CLSI EP5-A3, Evaluation of Precision of Quantitative Measurement Procedures; Approved Guideline – Third Edition. FDA Standards Recognition #7-251	Analysis of the data collected demonstrates that the Flow-Check Pro have acceptable lot variability performance.
ClearLLab Compensation Kit with ClearLLab Compensation Beads Reagent Stability	Demonstrate reagent stability.	None	None	Analysis of the data collected demonstrates that the Compensation Kit and Compensation Beads meet performance requirements in support of the products' stability claims.
IOTest 3 Lysing Solution and Fixative Reagent Stability	Demonstrate reagent stability.	None	None	Analysis of the data collected demonstrates that the IOTest 3 Fixative Solution and Lysing Solutions meet performance requirements in support of the product's stability claims.
Flow-Set Pro Fluorospheres Reagent Stability	Demonstrate reagent stability.	None	CLSI EP25-A – Evaluation of Stability of In Vitro Diagnostic Reagents. Approved Guideline; FDA Standards Recognition #7-235	Analysis of the data collected demonstrates that the Flow-Set Pro Fluorospheres meet performance requirements in support of the product's stability claims.

Flow-Check Pro Fluorospheres Reagent Stability	Demonstrate reagent stability.	None	CLSI EP25-A – Evaluation of Stability of In Vitro Diagnostic Reagents. Approved Guideline; FDA Standards Recognition #7-235	Analysis of the data collected demonstrates that the Flow-Check Pro Fluorospheres meet performance requirements in support of the product's stability claims.
Flow-Set Pro Analyte Value Assignment	Define Flow-Set Pro Target ranges for use with the ClearLLab 10C panels and define a process for ranges transfer from one lot of Flow-Set Pro Fluorospheres.	None	None	Analysis of the data collected demonstrates that appropriate Flow-Set Pro target ranges are defined for use with the ClearLLab 10C panels and that a process for ranges transfer from one lot of Flow-Set Pro Fluorospheres to another one is in place.

Substantial Equivalence Conclusion to Demonstrate Safety, Effectiveness & Equivalent Performance to Predicate:

The ClearLLab 10C Reagents, that are the subject of this submission, in concert with the conclusions drawn from the performance testing discussed above demonstrate that when compared to the predicate device is as safe, as effective, and meets the performance acceptance criteria.

In summary, the ClearLLab 10C Reagents as described in this submission is substantially equivalent in terms of safety and effectiveness to its predicate devices.

- The ClearLLab 10C Reagents are substantially equivalent to the ClearLLab Reagents (5C).

This summary of safety and effectiveness is being submitted in accordance with the requirements of the Safe Medical Device Act of 1990 and the implementing regulation 21 CFR 807.92.