510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
INSTRUMENT ONLY TEMPLATE

A. 510(k) Number:

K051693

B. Purpose for Submission:

Addition of new parameter

C. Manufacturer and Instrument Name:

Bayer HealthCare LLC, Diagnostics Division, ADVIA 2120 with Autoslide System

D. Type of Test or Tests Performed:

Nucleated Red Blood Cells (nRBC) Method, quantitative

E. System Descriptions:

1. Devise Description:

   The technological and methodological principles of the ADVIA 2120 with Autoslide used for the measurement of blood cells in whole blood specimens will be used without change except for the addition of a new methodology to quantitate nucleated red blood cells and correct white blood cells in peripheral whole blood.

   The ADVIA 2120 nRBC method reports nRBC counts for whole blood with either 200 or more nRBC/µL, or with at least 2% nRBCs with a WBC count of at least 3,000/ul.

   The method reports both an absolute nRBC count (10^9/L) and a percentage count (#nRBC/100 WBC). The software corrects the WBC count for nRBC, recalculates the WBC differential, and recalculates %MN and %PMN. The uncorrected counts are also available and are designated by a lower case "u."

2. Principles of Operation:

   The ADVIA 2120 nRBC method uses histogram analysis routines to analyze the unstained region of the Peroxidase channel as well as arithmetic an algorithm that combines counts from the Peroxidase and Basophil/Lobularity channel to enumerate nRBCs.

The analysis corrects the White Blood Cell Count (WBC) for the presence of nRBCs, as well as the WBC Differential. It reports the corrected WBC count and the corrected differential.

3. Modes of Operation:

   Not applicable.

4. Specimen Identification:

   Not applicable.

5. Specimen Sampling and Handling:

   The ADVIA 2120 nRBC method requires whole blood collected in an evacuated tube containing EDTA as an anticoagulant. Samples requiring nRBC count should not be refrigerated and must be analyzed within eight hours of phlebotomy.

6. Calibration:

   Proper calibration of the ADVIA 2120 Baso WBC and Perox WBC counts are required for accurate nRBC counts. Calibration is as necessary using the instructions provided by the *ADVIA 2120 Hematology System Operator's Guide*.

7. Quality Control:

   Quality control of the ADVIA 2120 nRBC method can be performed with commercially available control materials. In the event that control materials are not available, the method should be controlled following agency requirement for the user's laboratory.

8. Software:

   The ADVIA 2120 software updates the Run Screen options and provides unit set options to support nRBC analysis. The customer is to refer to the *ADVIA Hematology System Operator's Guide* for detailed instructions on configurations.

   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 864.5200, Automated cell counter
   21 CFR 864.5220, Automated differential cell counter
   21 CFR 864.3800, Automated slide stainer

2. Classification:

   Class II

3 Product code:

   GKL, Counter, Cell, Automated (Particle Counter)
   GKZ, Counter, Differential Cell
   KPA, Slide Stainer, Automated

4. Panel:

   Hematology (81)

G. Intended Use:

1. Indication(s) for Use:

   The ADVIA 2120 Nucleated Red Blood Cells (nRBC) Method nRBC method is intended to provide an in vitro diagnostic, quantitative determination of nucleated red blood cells in peripheral whole blood.

2. Special Conditions for Use Statement(s):
   Not applicable.

H. Substantial Equivalence Information:

1. Predicate Device Name(s) and 510(k) numbers:

   ADVIA 2120 with Autoslide System, K042251

2. Comparison with Predicate Device:

Similarities		
Item	Device	Predicate
	ADVIA 2120 with Autoslide and nRBC Method	*ADVIA 2120 with Autoslide*
Intended Use	Same/w Additional parameter for red blood cell analysis for percent nucleated Red Blood Cells (% nRBC) and absolute nRBC count (# nRBC per microliter)	Quantitative, automated hematology analyzer that provides a leukocyte differential count and reticulocyte analysis for in vitro diagnostic use in clinical laboratories. In addition, the system provides the added capability to automatically prepare and stain high quality blood smears on a microscope slide.
Technology	Analytical Module that aspirates, dilutes and analyzes whole blood samples; an auto sampler that automatically mixes, identifies, and presents samples for processing, a computer workstation that provides the software to control the instrument provides user interface and supports the management of the data, and Autoslide module that provides the added capability to automatically prepare and stain high-quality blood smears on a microscope slide.	Same
Reagents	Reagents to support Complete Blood Count, White Blood Cell Differential, Reticulocyte analysis and Staining reagents	Same

I. Special Control/Guidance Document Referenced (if applicable):

H20-A *Reference Leukocyte Differential Count (Proportional) and Evaluation of Instrument Methods, Approved Standard*, NCCLS

J. Performance Characteristics*:*

1. Analytical Performance:

a. Accuracy:

Systematic bias of the ADVIA 2120 nRBC count was evaluated by comparing ADVIA 2120 nRBC counts to reference manual counts for 744 samples collected at clinical trial sites. Regression statistics are found in the table that follows:

Parameter	r	Slope	Intercept	Manual Mean	ADVIA 2120 Mean	Bias
nRBC%	0.970	0.98	-0.6	11.9	11.1	-0.8
#nRBC ($x10^9$/L)	0.992	0.98	-0.15	1.91	1.82	-0.09
Corrected WBC	0.997	1.02	-0.14	11.54	11.64	0.10

The ADVIA 2120 only provides an accurate nRBC count for samples with ≥ 2% nRBC.

b. Precision/Reproducibility:

Within run precision was evaluated by performing duplicate assays of 45 samples with nRBC counts of 2% or more. Precision results are as follows:

Parameter	Mean	SD	CV
nRBC%	26.7	4.6	17.2
#nRBC ($x10^o$/L)	4.0	0.4	10.0
Corrected WBC	14.7	0.5	3.4

c. Linearity:

The analytical range or range of reportable values for nRBC% is 2 – 300%. #nRBC values are reportable if the nRBC% associated with the #nRBC value falls within those limits.

In a study to evaluate the performance of the ADVIA 2120 nRBC% over the analytical range the nRBC method was found to have a specificity of 92% at a level of 2% nRBCs.

d. Carryover:

The ADVIA 2120 nRBC method uses hydraulic cycles that are identical to those contained in software versions prior to version 5.2.x. Therefore, the expected carryover remains the same when using version 5.2.x (< 1% for all parameters).

e. Interfering Substances:

- Unlysed RBCs: The RBCs from peripheral blood samples from newborns and patients with certain disorders (e.g. thalassemia) may be resistant to lysis. The unlysed RBCs occupy the same region of the Peroxidase cytogram as the nRBCs and interfere with the count.
- Large platelets: In certain disease states the peripheral blood may contain many large platelets that also occupy the same region of the Peroxidase channel as nRBCs. The large platelets will interfere with nRBC enumeration.
- Lipids: Samples from patients undergoing total parenteral nutrition may contain lipids of high enough concentration to interfere with sample analysis on the ADVIA 2120. The effect is observed in both the ADVIA 2120 Peroxidase and Basophil/Lobularity channels and could compromise the nRBC count.

  The ADVIA 2120 software provides four sample/system flags to help identify samples that may have invalid nRBC counts due to interfering substances.

2. Other Supportive Instrument Performance Data Not Covered Above:

K. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

L. Conclusion:

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