510(k) Summary

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

The assigned 510(k) number is K060375.

JUN - 6 2006

Submitter Information

Submitter: BD Biosciences
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Summary Date: February 9, 2006

Device Name and Classification

Trade Name:	BD Multitest 6-color TBNK reagent with BD Trucount tubes
Classification Name:	Automated Differential Cell Counter
Regulation Number:	21 CFR 862.5220
Product Code:	GKZ

Substantially Equivalent Predicate Device

BD Multitest 6-color TBNK reagent with BD Trucount tubes is substantially equivalent to BD Multitest IMK kit (K980858) when used with the BD FACSCanto system with BD FACSCanto clinical software (K041074).

Device Description

The BD Multitest 6-Color TBNK reagent is a six-color direct immunofluorescence reagent for use with the BD FACSCanto system to identify and determine the percentages and absolute counts (using BD Trucount tubes) of T, B, and natural killer (NK) cells as well as the CD4 and CD8 subpopulations of T cells in peripheral blood.

When a known volume of whole blood is added to the reagent in a BD Trucount tube, the fluorochrome-labeled antibodies in the reagent bind specifically to leucocyte surface antigens. The stained samples are treated with BD FACS lysing solution to lyse erythrocytes, and the lyophilized pellet in the BD Trucount tube dissolves, releasing a known number of fluorescent beads.

During acquisition, the cells and beads travel past two laser beams and scatter the laser light. The stained cells and beads fluoresce at different intensities. These scatter and fluorescence signals, detected by the flow cytometer, provide information about each cell's size, internal complexity, and relative fluorescence intensity. During analysis, the absolute number (cells/μL) of positive cells in the sample can be determined by comparing cellular events to bead events.

Intended Use

BD Multitest 6-Color TBNK reagent with BD Trucount tubes is intended for in vitro diagnostic use with the BD FACSCanto system to identify and determine the percentages and absolute counts of T, B, and natural killer (NK) cells as well as the CD4 and CD8 subpopulations of T cells in peripheral blood.

Comparison to Predicate Device

Characteristic	***Predicate:*** **BD Multitest IMK Kit with BD Trucount Tubes (K980858) and BD FACSCanto System with BD FACSCanto Clinical Software (K041074)**	***Candidate:*** **BD Multitest 6-Color TBNK Reagent with BD Trucount Tubes**
Intended Use	Identification and determination of percentages and absolute counts of the following mature human lymphocyte subsets in erythrocyte-lysed whole blood: T lymphocytes (CD3+, CD3+CD4+, and CD3+CD8+), B lymphocytes (CD3-CD19+), and NK lymphocytes (CD3-CD16+CD56+).	Same.
Components (including Cluster Designation, Conjugation, and Clone)	BD Multitest CD3/CD16+CD56/CD45/CD19 (1 vial, 50 tests) • CD3 FITC (SK7) • CD16 PE (B73.1) + CD56 PE (NCAM16.2) • CD45 PerCP (2D1) • CD19 APC (SJ25C1) • Buffer with 0.1% sodium azide BD Multitest CD3/CD8/CD45/CD4 (1 vial, 50 tests) • CD3 FITC (SK7) • CD8 PE (SK1) • CD45 PerCP (2D1) • CD4 APC (SK3) • Buffer with 0.1% sodium azide BD FACS Lysing Solution BD Trucount Tubes (100 tubes)	BD Multitest 6-Color TBNK Reagent (1 vial, 50 tests) • CD4 PE-Cy7 (SK3) • CD8 APC-Cy7 (SK1) • CD3 FITC (SK7) • CD19 APC (SJ25C1) • CD16 PE (B73.1) + CD56 PE (NCAM16.2) • CD45 PerCP-Cy5.5 (2D1) • Buffer with 0.1% sodium azide BD Trucount Tubes (50 tubes) BD FACS Lysing Solution (not included with reagent)

Characteristic	*Predicate:* **BD Multitest IMK Kit with BD Trucount Tubes (K980858) and BD FACSCanto System with BD FACSCanto Clinical Software (K041074)**	*Candidate:* **BD Multitest 6-Color TBNK Reagent with BD Trucount Tubes**
Specificity	Specificities of antibodies have been verified by the International Workshop on Human Leukocyte Differentiation Antigens.[1,2,3,4,5,6]	Same.
Method to Identify Populations of Interest	Lyse/no-wash method using a two-tube panel with four-color antibody reagents (one tube stained with CD3/CD16+CD56/CD45/CD19, the other with CD3/CD8/CD45/CD4) to identify lymphocytes with specific cell-surface antigens, fluorescence triggering, and CD45 vs. SSC for gating. Uses fluorescent beads to quantify absolute counts.	Same, except uses a one-tube panel with six-color antibody reagent.

[1] Haynes BF. Summary of T-cell studies performed during the Second International Workshop and Conference on Human Leukocyte Differentiation Antigens. In: Reinherz EL, Haynes BF, Nadler LM, Bernstein ID, eds. *Leukocyte Typing II: Human T Lymphocytes.* New York, NY: Springer-Verlag; 1986;1:3-30.

[2] Schmidt RE. Non-lineage/natural killer section report: new and previously defined clusters. In: Knapp W, Dörken B, Gilks WR, et al, eds. *Leucocyte Typing IV: White Cell Differentiation Antigens.* New York, NY: Oxford University Press; 1989:517-542.

[3] Ritz J, Trinchieri G, Lanier LL. NK-cell antigens: section report. In: Schlossman SF, Boumsell L, Gilks W, et al, eds. *Leucocyte Typing V: White Cell Differentiation Antigens.* New York, NY: Oxford University Press; 1995;2:1367-1372.

[4] Cobbold SP, Hale G, Waldmann H. Non-lineage, LFA-1 family, and leucocyte common antigens: new and previously defined clusters. In: McMichael AJ, ed. *Leucocyte Typing III: White Cell Differentiation Antigens.* New York, NY: Oxford University Press; 1987:788-803.

[5] Bernard A, Boumsell L, Hill C. Joint report of the first international workshop on human leucocyte differentiation antigens by the investigators of the participating laboratories: T2 protocol. In: Bernard A, Boumsell L, Dausset J, Milstein C, Schlossman SF, eds. *Leucocyte Typing.* New York, NY: Springer-Verlag; 1984:25-60.

[6] Nadler LM. B Cell/Leukemia Panel Workshop: summary and comments. In: Reinherz EL, Haynes BF, Nadler LM, Bernstein ID, eds. *Leukocyte Typing II: Human B Lymphocytes.* New York, NY: Springer-Verlag; 1986;2:3-43.

Characteristic	***Predicate:*** **BD Multitest IMK Kit with BD Trucount Tubes (K980858) and BD FACSCanto System with BD FACSCanto Clinical Software (K041074)**	***Candidate:*** **BD Multitest 6-Color TBNK Reagent with BD Trucount Tubes**
Control	Recommend use of commercially available whole blood control with established values for subset percentages and absolute counts.	Recommend use of two levels of commercially available whole blood controls with established values for subset percentages and absolute counts. BD specifically recommends the use of BD Multi-Check and BD Multi-Check CD4 Low controls.
Instrument and Software	BD FACSCanto flow cytometer with BD FACSCanto clinical software version 1.0.	Same, except uses version 2.0 of BD FACSCanto clinical software.
System Setup	BD FACSCanto flow cytometer with BD FACSCanto clinical software version 1.0 and BD FACS 7-color setup beads.	Same, except uses version 2.0 of BD FACSCanto clinical software.
Sample and Stain Stability	Anticoagulated blood stored at room temperature (20–25°C) must be stained within 48 hours of draw and then analyzed within 24 hours of staining.	Anticoagulated blood stored at room temperature (20–25°C) must be stained within 24 hours of draw and then analyzed within 6 hours of staining.
Results	CD3+, CD3+CD4+, and CD3+CD8+ T lymphocytes; CD3-CD19+ B lymphocytes, and CD3-CD16+CD56+ NK lymphocytes expressed as percentages of total lymphocytes or as absolute counts (cells/μL) in whole blood.	Same.
Sample Type	Erythrocyte-lysed whole blood, collected in K_3 EDTA blood collection tubes.	Same.

Summary of Performance Data

Substantial equivalence and the performance of BD Multitest 6-color TBNK reagent with BD Trucount tubes have been demonstrated through accuracy, precision, linearity, and sample and stain stability studies.

Accuracy

The accuracy study design was based on NCCLS document EP9-A2, *Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline – Second Edition.* The predicate method was BD Multitest IMK kit (K980858) on the BD FACSCanto system with BD FACSCanto clinical software (K041074).

Lymphocyte Subset Percentages

Lymphocyte Subset	**n**	**Mean Bias (%)** (95% CI)	**Range for Test System (%)** (Predicate System)
CD4	117	**0.1** (-0.1, 0.2)	**0.51 – 66.86** (0.81 – 68.67)
CD8	117	**-0.8** (-1.0, -0.5)	**10.77 – 83.43** (10.91 -83.09)
CD3	117	**- 0.2** (-0.4, 0.0)	**33.81 – 88.45** (33.12 – 89.51)
CD19	117	**0.3** (0.2, 0.4)	**0.1 – 35.89** (0.08 – 35.77)
CD16+CD56	117	**-0.1** (-0.3, 0.0)	**2.44 – 51.47** (3.04 – 50.84)

Lymphocyte Subset Absolute Counts

Lymphocyte Subset	**n**	**Mean Bias (%) (95% CI)**	**Range for Test System (cells/µL) (Predicate System)**
CD4	117	**-2.7** (-4.2, -1.3)	**4.39 – 1592.79** (6.23 – 1590.7)
CD8	117	**-3.5** (-4.4, -2.6)	**50.79 – 2416.16** (57.91 – 2194.02)
CD3	117	**-1.9** (-2.6, -1.2)	**107.14 – 3403.08** (108.74 – 3231.05)
CD19	117	**1.8** (0.3, 3.3)	**0.5 – 1207.49** (0.42 – 1199.38)
CD16+CD56	117	**-2.3** (-4.1, 0.5)	**6.7 – 918.43** (7.94 – 955)

Precision

The precision study design was based on NCCLS document EP5-A, *Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline.*

Repeatability of Lymphocyte Subset Percentages

Lymphocyte Subset	**n**	**Low Sample[7] SD**	**Normal Sample[8] SD**
CD4	42	0.64	0.95
CD8	42	1.07	0.65
CD3	42	1.17	0.86
CD19	42	0.89	062
CD16+CD56	42	0.90	0.61

[7] Streck CD-Chex Plus CD4 Low controls.

[8] Streck CD-Chex Plus controls.

Within-Device Precision for Lymphocyte Subset Percentages

Lymphocyte Subset	n	Low Sample SD	Normal Sample SD
CD4	42	0.69	1.23
CD8	42	1.29	0.81
CD3	42	1.23	0.90
CD19	42	0.89	0.62
CD16+CD56	42	0.96	0.62

Repeatability of Lymphocyte Subset Absolute Counts

Lymphocyte Subset	n	Low Sample %CV	Normal Sample %CV
CD4	42	7.6	4.7
CD8	42	4.1	4.7
CD3	42	4.0	4.2
CD19	42	5.7	5.3
CD16+CD56	42	7.0	7.9

Within-Device Precision of Lymphocyte Subset Absolute Counts

Lymphocyte Subset	n	Low Sample %CV	Normal Sample %CV
CD4	42	8.0	4.8
CD8	42	5.0	5.4
CD3	42	4.4	4.2
CD19	42	6.0	5.7
CD16+CD56	42	8.0	7.9

Linearity

The linearity study design was based on NCCLS document EP6-A, *Evaluation of the Linearity of Quantitative Analytical Methods; Approved Guideline.* Concentration levels were established based on an expected CD4+ range of 200 to 3,000 cells/µL.

Lymphocyte Subset Linear Ranges for Absolute Counts

Lymphocyte Subset	**Linear Range (cells/µL)**	**R^2**
CD4	4 – 2,234	0.998
CD8	158 – 1,125	0.991
CD3	498 – 3,356	0.996
CD19	71 – 447	0.989
CD16+CD56	0 – 1,559	0.999

Sample and Stain Stability

Whole blood should be collected aseptically by venipuncture using K_3 EDTA blood collection tubes. Anticoagulated blood stored at room temperature (20 – 25° C) must be stained within 24 hours of draw and then analyzed within 6 hours of staining.

Conclusions from Performance Data

BD Multitest 6-color TBNK reagent with BD Trucount tubes is substantially equivalent to the predicate device.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

JUN - 6 2006

BD Biosciences
c/o Mr. Carter Navarro
Regulatory Affairs Specialist
2350 Qume Dr.
San Jose, CA 95131-1807

Re: k060375
Trade/Device Name: BD Multitest 6-color TBNK reagent with BD Trucount tubes
Regulation Number: 21 CFR 864.5220
Regulation Name: Automated Differential Cell Counter
Regulatory Class: Class II
Product Code: GKZ
Dated: February 10, 2006
Received: February 13, 2006

Dear Mr. Navarro:

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. 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.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such 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); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of Compliance at (240) 276-0484. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (240) 276-3150 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Maria Chan for
Dr Robert Becker

Robert L. Becker, Jr., M.D., Ph.D.
Director
Division of Immunology and Hematology Devices
Office of In Vitro Diagnostic Device Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

Indications for Use Statement

510(k) Number: K060375

Device Name: BD Multitest 6-color TBNK reagent with BD Trucount tubes

Indications For Use:

- For use with the BD FACSCanto flow cytometer.
- For use with whole blood collected in K_3 EDTA tubes.
- For use in the identification and determination of percentages and absolute counts of T, B, and natural killer (NK) cells as well as the CD4 and CD8 subpopulations of T cells in peripheral blood.
- For in vitro diagnostic use.

Prescription Use ___X___ (Part 21 CFR 801 Subpart D) AND/OR Over-The-Counter Use _____ (21 CFR 801 Subpart C)

PLEASE DO NOT WRITE BELOW THIS LINE –
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Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Maria Chan for Josephine Bautista

Division Sign-Off

Office of In Vitro Diagnostic Device Evaluation and Safety

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