DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
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Silver Spring, MD 20993-0002

June 21, 2017

Caltag Medsystems Ltd.
Erika B Ammirati
575 Shirlynn Court
Los Altos, CA 94022

Re: K162723
Trade/Device Name: TransFix®/EDTA Vacuum Blood Collection Tubes
Regulation Number: 21 CFR 862.1675
Regulation Name: Blood specimen collection device
Regulatory Class: II
Product Code: GIM
Dated: May 24, 2017
Received: May 25, 2017

Dear Ms. Ammirati:

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. 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 Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); 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.

If you desire specific advice for your device on our labeling regulations (21 CFR Parts 801 and 809), please contact the Division of Industry and Consumer Education at its toll-free number (800) 638 2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm. 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 the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Kelly Oliner -S

FOR
Leonthena R. Carrington, MS, MBA, MT(ASCP)
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: January 31, 2017
See PRA Statement below.

510(k) Number *(if known)*
K162723

Device Name
TransFix/EDTA Vacuum Blood Collection Tubes (TVTs)

Indications for Use *(Describe)*

TransFix/EDTA Vacuum Blood Collection Tubes (TVTs) are intended for collection and storage of human whole blood specimens for immunophenotyping of white blood cells by flow cytometry. Recovery of lymphocyte subset markers of the HIV panel can be accomplished over a 14-day period following collection.

TVTs are in-vitro diagnostic medical devices.

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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510(k) SUMMARY

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92. The assigned 510(k) number is K162723.

807.92 (a)(1): Name: Caltag Medsystems Ltd.

Address: Whiteleaf Business Centre
11, Little Balmer
Buckingham
MK18 1TF
UK

Phone: 011 44 1280 827 460
FAX: 011 44 1280 827 466

Contact: Mr. Daniel Harrison
Quality Manager

807.92 (a)(2): Device name- trade name and common name, and classification

Trade name:
TransFix®/EDTA Vacuum Blood Collection Tubes

Common Name: Blood specimen collection device- tubes, vacuum sample, with anticoagulant

Classification: 21 CFR § 862.1675– blood specimen collection device
Class: Class II
Panel: Clinical Chemistry and Toxicology
Product Code: GIM

807.92 (a)(3): Identification of the legally marketed predicate devices
Cyto-Chex® BCT (Blood Collection Tubes, Streck Laboratories, Inc., Omaha, NE), cleared under K080552

807.92 (a)(4): Device Description
TransFix®/EDTA Vacuum Blood Collection Tubes (TVTs) are intended for collection and storage of human whole blood specimens for immunophenotyping of white blood cells (WBC, leukocytes) by flow cytometry up to 14-days following collection; the TVTs preserve the qualitative and quantitative leukocyte subset characteristics. Flow cytometry is used to identify subsets of leukocytes that can be distinguished on the basis of cell surface antigens using fluorescent antibodies.

The TransFix®/EDTA Vacuum Blood Collection Tubes (TVTs) consist of purple-capped polyethylene terephthalate blood collection tubes containing the paraformaldehyde based preservative, TransFix, and K_3EDTA at the correct volume to simultaneously stabilize and anti-coagulate human whole blood at the time of collection. TVTs hold 3mL (final draw volume) with a tube dimension of 13 x 75mm. TVTs are sterilized by gamma radiation. Further, the vacuum contained within the TVT ensures that the TransFix/EDTA reagent is administered at the correct ratio of 1 part TransFix/EDTA to 5 parts whole blood.

807.92 (a)(5): Intended Use

TransFix/EDTA Vacuum Blood Collection Tubes (TVTs) are intended for collection and storage of human whole blood specimens for immunophenotyping of white blood cells by flow cytometry. Recovery of lymphocyte subset markers of the HIV panel can be accomplished over a 14-day period following collection. TVTs are *in-vitro* diagnostic medical devices.

807.92 (a)(6): Technological Similarities and Differences to the Predicate

The TransFix®/EDTA Vacuum Blood Collection Tubes are substantially equivalent to the Cyto-Chex® BCT (BCT), Streck Laboratories, Inc., La Vista, NE), (K080552).

Parameter	TransFix® / EDTA Vacuum Blood Collection Tube	Cyto-Chex® BCT (K080552)
Intended use	For the collection and storage of blood specimens for immunophenotyping of WBC by flow cytometry.	Same
Tube size	13 x 75mm	Same
Preservation of HIV markers	14 days	Same
Tube type	Polyethylene terephthalate	Glass
Contents	Liquid reagent: K_3EDTA and TransFix preservative	Liquid reagent: K_3EDTA and preservative
Sample volume	2.5mL	5 mL
Liquid reagent	0.5mL	75.8µl

807.92 (b)(1,2): Brief Description of Nonclinical and Clinical Data

Reproducibility- Repro Studies 1 and 2

Repro Study 1:

The objective of the study (along with Reproducibility Study 2) was to assess the variability of the 3mL TransFix®/EDTA Vacuum Blood Collection Tube (TVT). This was achieved by collecting blood into six TVTs (two tubes from each of three lots) from five healthy subjects whose blood samples spanned the absolute cell count range for lymphocytes and their subsets. The study compared the lymphocyte absolute cell counts recorded from each TVT sample for three test time points (0, 12 and 15 days post venipuncture). At each time point, testing was performed with triplicate determinations on each of the duplicate TVTs from each of the three lots.

For each sample, all 6 biomarkers were tested (CD3, CD8, CD4, CD45, CD16/CD56, CD19). Thus, the components of variation for analysis included:

1. Between-Day
2. Between- Tube Lot
3. Between-Tube
4. Between-Replicate
5. Total precision (the combined precision of factors 1-4)

The data are presented in Tables 1-6.

CD3+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	1470.3	49.2 (41.3-60.7)	3.3 (2.8-4.1)	52.2 (43.8-64.4)	3.5 (3.0-4.4)	46.0 (38.7-56.8)	3.1 (2.6-3.9)	14.6 (12.3-18.1)	1.0 (0.8-1.2)	89.9 (75.6-111.0)	6.1 (5.1-7.5)
HC B	54	1183.6	46.0 (38.7-56.8)	3.9 (3.3-4.8)	41.4 (34.8-51.1)	3.5 (2.9-4.3)	28.5 (24.0-35.2)	2.4 (2.0-3.0)	16.4 (13.7-20.2)	1.4 (1.2-1.7)	72.8 (61.2-89.9)	6.2 (5.2-7.6)
HC C	54	404.7	7.1 (6.0-8.8)	1.8 (1.5-2.2)	10.4 (8.7-12.8)	2.6 (2.2-3.2)	2.7 (2.3-3.4)	0.7 (0.6-0.8)	6.1 (5.1-7.5)	1.5 (1.3-1.9)	19.4 (16.3-23.9)	4.8 (4.0-5.9)
HC D	54	1334.9	5.9 (4.9-7.2)	0.4 (0.4-0.5)	35.8 (30.1-44.3)	2.7 (2.3-3.3)	32.0 (26.9-39.5)	2.4 (2.0-3.0)	7.3 (6.1-9.0)	0.5 (0.5-0.7)	62.4 (52.5-77.0)	4.7 (3.9-5.8)
HC E	54	1458.9	25.7 (21.6-31.7)	1.8 (1.5-2.2)	62.9 (52.9-77.6)	4.3 (3.6-5.3)	22.0 (18.5-27.1)	1.5 (1.3-1.9)	16.4 (13.7-20.2)	1.1 (0.9-1.4)	82.5 (69.4-101.8)	5.7 (4.8-7.0)

Table 1 demonstrates that the 3mL TVT lots were sufficiently precise for the CD3 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD8+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	517.7	44.7 (37.5-55.1)	8.6 (7.2-10.6)	29.2 (24.6-36.1)	5.6 (4.7-7.0)	12.5 (10.5-15.5)	2.4 (2.0-3.0)	1.4 (1.1-1.7)	0.3 (0.2-0.3)	56.0 (47.1-69.1)	10.8 (9.1-13.4)
HC B	54	451.2	25.4 (21.3-31.3)	5.6 (4.7-6.9)	19.6 (16.5-24.3)	4.4 (3.7-5.4)	8.1 (6.8-10.0)	1.8 (1.5-2.2)	5.2 (4.4-6.4)	1.1 (1.0-1.4)	34.1 (28.7-42.1)	7.6 (6.4-9.3)
HC C	54	167.7	8.6 (7.3-10.7)	5.2 (4.3-6.4)	11.3 (9.5-13.9)	6.7 (5.6-8.3)	3.6 (3.1-4.5)	2.2 (1.8-2.7)	3.1 (2.6-3.8)	1.8 (1.5-2.3)	16.6 (14.0-20.5)	9.9 (8.3-12.2)
HC D	54	758.4	11.2 (9.4-13.8)	1.5 (1.2-1.8)	20.2 (17.0-24.9)	2.7 (2.2-3.3)	7.4 (6.2-9.1)	1.0 (0.8-1.2)	4.5 (3.8-5.6)	0.6 (0.5-0.7)	46.8 (39.3-57.8)	6.2 (5.2-7.6)
HC E	54	572.1	3.4 (2.9-4.2)	0.6 (0.5-0.7)	27.1 (22.8-33.5)	4.7 (4.0-5.9)	8.8 (7.4-10.9)	1.5 (1.3-1.9)	11.0 (9.2-13.6)	1.9 (1.6-2.4)	40.2 (33.8-49.6)	7.0 (5.9-8.7)

Table 2 demonstrates that the 3mL TVT lots were sufficiently precise for the CD8 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD4+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	767.5	29.9 (25.2-37.0)	3.9 (3.3-4.8)	29.5 (24.8-36.4)	3.8 (3.2-4.7)	21.6 (18.1-26.6)	2.8 (2.4-3.5)	12.5 (10.5-15.4)	1.6 (1.4-2.0)	59.0 (49.6-72.8)	7.7 (6.5-9.5)
HC B	54	685.0	25.4 (21.4-31.4)	3.7 (3.1-4.6)	7.9 (6.6-9.8)	1.2 (1.0-1.4)	11.6 (9.7-14.3)	1.7 (1.4-2.1)	9.3 (7.9-11.5)	1.4 (1.1-1.7)	44.5 (37.4-54.9)	6.5 (5.5-8.0)
HC C	54	197.9	7.2 (6.1-8.9)	3.7 (3.1-4.5)	0.9 (0.8-1.1)	0.5 (0.4-0.6)	0.8 (0.7-1.0)	0.4 (0.3-0.5)	2.3 (1.9-2.8)	1.2 (1.0-1.4)	16.0 (13.4-19.8)	8.1 (6.8-10.0)
HC D	54	496.3	11.9 (10.0-14.7)	2.4 (2.0-3.0)	11.4 (9.6-14.1)	2.3 (1.9-2.8)	8.0 (6.8-9.9)	1.6 (1.4-2.0)	4.9 (4.1-6.1)	1.0 (0.8-1.2)	35.0 (29.4-43.2)	7.1 (5.9-8.7)
HC E	54	828.2	6.9 (5.8-8.5)	0.8 (0.7-1.0)	24.8 (20.9-30.6)	3.0 (2.5-3.7)	7.1 (5.9-8.7)	0.9 (0.7-1.1)	23.7 (19.9-29.2)	2.9 (2.4-3.5)	52.4 (44.0-64.7)	6.3 (5.3-7.8)

Table 3 demonstrates that the 3mL TVT lots were sufficiently precise for the CD4 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

Lymph CD45+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	2306.7	70.3 (59.1-86.8)	3.0 (2.6-3.8)	67.7 (56.9-83.6)	2.9 (2.5-3.6)	72.0 (60.6-88.9)	3.1 (2.6-3.9)	18.3 (15.4-22.6)	0.8 (0.7-1.0)	127.1 (106.8-156.9)	5.5 (4.6-6.8)
HC B	54	1730.2	49.3 (41.4-60.9)	2.8 (2.4-3.5)	63.5 (53.4-78.4)	3.7 (3.1-4.5)	29.7 (25.0-36.6)	1.7 (1.4-2.1)	26.1 (21.9-32.2)	1.5 (1.3-1.9)	97.1 (81.6-119.9)	5.6 (4.7-6.9)
HC C	54	720.5	9.9 (8.3-12.2)	1.4 (1.2-1.7)	27.7 (23.2-34.1)	3.8 (3.2-4.7)	9.6 (8.1-11.9)	1.3 (1.1-1.6)	11.3 (9.5-14.0)	1.6 (1.3-1.9)	37.5 (31.5-46.3)	5.2 (4.4-6.4)
HC D	54	1683.0	6.7 (5.6-8.2)	0.4 (0.3-0.5)	34.2 (28.8-42.3)	2.0 (1.7-2.5)	34.3 (28.8-42.3)	2.0 (1.7-2.5)	10.4 (8.7-12.8)	0.6 (0.5-0.8)	75.8 (63.7-93.6)	4.5 (3.8-5.6)
HC E	54	1952.0	19.3 (16.2-23.8)	1.0 (0.8-1.2)	88.5 (74.4-109.2)	4.5 (3.8-5.6)	34.4 (28.9-42.4)	1.8 (1.5-2.2)	20.2 (17.0-24.9)	1.0 (0.9-1.3)	107.8 (90.6-133.1)	5.5 (4.6-6.8)

Table 4 demonstrates that the 3mL TVT lots were sufficiently precise for the CD45 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD16+CD56+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	377.1	12.3 (10.4-15.2)	3.3 (2.8-4.0)	0.1 (0.1-0.1)	0.0 (0.0-0.0)	11.6 (9.7-14.3)	3.1 (2.6-3.8)	2.3 (2.0-2.9)	0.6 (0.5-0.8)	24.9 (20.9-30.7)	6.6 (5.6-8.2)
HC B	54	366.7	15.9 (13.4-1.9.6)	4.3 (3.6-5.4)	21.0 (17.7-26.0)	5.7 (4.8-7.1)	4.3 (3.6-5.4)	1.2 (1.0-1.5)	8.0 (6.7-9.9)	2.2 (1.8-2.7)	31.1 (26.1-38.4)	8.5 (7.1-10.5)
HC C	54	209.5	6.4 (5.4-7.9)	3.1 (2.6-3.8)	15.4 (13.0-19.0)	7.4 (6.2-9.1)	5.2 (4.3-6.4)	2.5 (2.1-3.0)	3.4 (2.8-4.2)	1.6 (1.4-2.0)	17.2 (14.5-21.2)	8.2 (6.9-10.1)
HC D	54	217.7	6.4 (5.4-7.9)	3.0 (2.5-3.6)	5.1 (4.3-6.3)	2.3 (2.0-2.9)	4.2 (3.6-5.2)	1.9 (1.6-2.4)	3.9 (3.3-4.8)	1.8 (1.5-2.2)	15.5 (13.0-19.1)	7.1 (6.0-8.8)
HC E	54	296.9	11.5 (9.7-14.2)	3.9 (3.3-4.8)	15.1 (12.7-18.7)	5.1 (4.3-6.3)	9.6 (8.1-11.8)	3.2 (2.7-4.0)	4.2 (3.5-5.2)	1.4 (1.2-1.8)	26.6 (22.4-32.8)	9.0 (7.5-11.1)

Table 5 demonstrates that the 3mL TVT lots were sufficiently precise for the CD16/56 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD19+			Between-Day		Between-Lot		Between-Tube		Between-Replicate		Total	
Sample #	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
HC A	54	352.7	9.0 (7.6-11.2)	2.6 (2.2-3.2)	14.0 (11.8-17.3)	4.0 (3.3-4.9)	4.7 (3.9-5.8)	1.3 (1.1-1.6)	6.5 (5.5-8.1)	1.9 (1.6-2.3)	26.2 (22.0-32.3)	7.4 (6.2-9.2)
HC B	54	112.9	2.0 (1.6-2.4)	1.7 (1.5-2.1)	1.4 (1.1-1.7)	1.2 (1.1-1.5)	0.1 (0.1-0.2)	0.1 (0.1-0.1)	4.4 (3.7-5.4)	3.9 (3.3-4.8)	8.2 (6.9-10.1)	7.3 (6.1-9.0)
HC C	54	53.7	0.5 (0.4-0.6)	0.8 (0.7-1.0)	0.7 (0.6-0.9)	1.3 (1.1-1.6)	0.8 (0.7-1.0)	1.5 (1.2-1.8)	0.7 (0.6-0.9)	1.4 (1.2-1.7)	4.4 (3.7-5.4)	8.2 (6.9-10.1)
HC D	54	106.5	1.6 (1.4-2.0)	1.5 (1.3-1.9)	2.9 (2.4-3.5)	2.7 (2.3-3.3)	2.9 (2.5-3.6)	2.7 (2.3-3.4)	3.3 (2.7-4.0)	3.1 (2.6-3.8)	10.5 (8.8-13.0)	9.9 (8.3-12.2)
HC E	54	151.2	3.6 (3.0-4.4)	2.4 (2.0-2.9)	4.6 (3.8-5.6)	3.0 (2.5-3.7)	2.4 (2.0-2.9)	1.6 (1.3-2.0)	2.6 (2.2-3.2)	1.7 (1.4-2.1)	10.0 (8.4-12.3)	6.6 (5.6-8.2)

Table 6 demonstrates that the 3mL TVT lots were sufficiently precise for the CD19 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

Repro Study 2:

The objective of this study was to build on the data set provided in Reproducibility Study 1, and add the effect of site-to-site testing. This was achieved by collecting blood into six TVTs (from the same lot) from five healthy subjects whose blood samples spanned the absolute cell count range for lymphocytes and their subsets. The study compared the lymphocyte absolute cell counts recorded from each TVT sample after they were tested at three clinical flow cytometry laboratories in the UK in order to analyze the following components of variation:

1. Between-Site (TVT sample results from different clinical laboratories).
2. Between-Tube (TVT sample results from a different tube, but of the same lot).
3. Between-Replicate (TVT sample results from the same tube).
4. Total precision (the combined precision of factors 1-3).

At each site, testing was performed with triplicate determinations on each of the duplicate TVTs using one lot of tubes. For each sample, all six biomarkers were tested (CD3, CD8, CD4, CD45, CD16/CD56, CD19). Thus, the components of variation for analysis included.

The data are presented in Tables 7-12.

CD3			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	1441.1	85.5 (64.2-128.2)	5.9 (4.5-8.9)	17.4 (13.1-26.1)	1.2 (0.9-1.8)	24.2 (18.2-36.3)	1.7 (1.3-2.5)	97.0 (72.8-145.4)	6.7 (5.1-10.1)
B	18	1435.7	107.4 (80.6-161.0)	7.5 (5.6-11.2)	13.2 (9.9-19.8)	0.9 (0.7-1.4)	28.7 (21.5-43.0)	2.0 (1.5-3.0)	103.9 (78.0-155.8)	7.2 (5.4-10.8)
C	18	372.3	12.4 (9.3-18.5)	3.3 (2.5-5.0)	9.5 (7.1-14.2)	2.5 (1.9-3.8)	20.7 (15.6-31.1)	5.6 (4.2-8.4)	28.4 (21.3-42.6)	7.6 (5.7-11.4)
D	18	1416.6	90.1 (67.6-135.1)	6.4 (4.8-9.5)	46.8 (35.2-70.2)	3.3 (2.5-5.0)	78.3 (58.7-117.4)	5.5 (4.1-8.3)	122.2 (91.7-183.2)	8.6 (6.5-12.9)
E	18	1195.1	52.0 (39.0-78.0)	4.4 (3.3-6.5)	49.9 (37.5-74.9)	4.2 (3.1-6.3)	67.1 (50.3-100.6)	5.6 (4.2-8.4)	86.0 (64.5-128.9)	7.2 (5.4-10.8)

Table 7 demonstrates that the 3mL TVT lots were sufficiently precise for the CD3 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD8			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	592.5	48.3 (36.2-72.4)	8.1 (6.1-12.2)	26.7 (20.0-40.0)	4.5 (3.4-6.8)	8.8 (6.6-13.1)	1.5 (1.1-2.2)	54.4 (40.8-81.6)	9.2 (6.9-13.8)
B	18	599.2	54.0 (40.5-80.9)	9.0 (6.8-13.5)	8.5 (6.4-12.8)	1.4 (1.1-2.1)	15.0 (11.3-22.5)	2.5 (1.9-3.8)	52.4 (39.3-78.6)	8.7 (6.6-13.1)
C	18	187.3	13.0 (9.8-19.5)	6.9 (5.2-10.4)	6.5 (4.9-9.7)	3.5 (2.6-5.2)	12.2 (9.1-18.2)	6.5 (4.9-9.7)	21.0 (15.8-31.5)	11.2 (8.4-16.8)
D	18	868.9	61.2 (46.0-91.8)	7.0 (5.3-10.6)	23.0 (17.2-34.4)	2.6 (2.0-4.0)	47.7 (35.8-71.4)	5.5 (4.1-8.2)	89.6 (67.2-134.3)	10.3 (7.7-15.5)
E	18	527.1	28.0 (21.0-42.0)	5.3 (4.0-8.0)	34.9 (26.2-52.4)	6.6 (5.0-9.9)	30.1 (22.6-45.1)	5.7 (4.3-8.6)	51.0 (38.3-76.5)	9.7 (7.3-14.5)

Table 8 demonstrates that the 3mL TVT lots were sufficiently precise for the CD8 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD4			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	782.1	26.7 (20.0-40.0)	3.4 (2.6-5.1)	4.3 (3.2-6.5)	0.6 (0.4-0.8)	17.4 (13.0-26.1)	2.2 (1.7-3.3)	48.8 (36.6-73.2)	6.2 (4.7-9.4)
B	18	828.2	46.0 (34.5-68.9)	5.6 (4.2-8.3)	24.7 (18.5-37.0)	3.0 (2.2-4.5)	12.9 (9.7-19.4)	1.6 (1.2-2.3)	51.6 (38.7-77.4)	6.2 (4.7-9.3)
C	18	165.9	5.0 (3.8-7.5)	3.0 (2.3-4.5)	0.6 (0.5-1.0)	0.4 (0.3-0.6)	7.6 (5.7-11.4)	4.6 (3.4-6.9)	16.3 (12.2-24.4)	9.8 (7.4-14.7)
D	18	488.2	23.8 (17.9-35.7)	4.9 (3.7-7.3)	10.9 (8.2-16.4)	2.2 (1.7-3.4)	19.5 (14.7-29.3)	4.0 (3.0-6.0)	42.7 (32.0-64.0)	8.7 (6.6-13.1)
E	18	646.1	13.7 (10.3-20.5)	2.1 (1.6-3.2)	36.4 (27.3-54.6)	5.6 (4.2-8.5)	28.0 (21.0-42.0)	4.3 (3.3-6.5)	48.5 (36.4-72.7)	7.5 (5.6-11.3)

Table 9 demonstrates that the 3mL TVT lots were sufficiently precise for the CD4 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD45			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	2221.6	124.3 (93.3-186.4)	5.6 (4.2-8.4)	27.1 (20.4-40.7)	1.2 (0.9-1.8)	29.1 (21.9-43.7)	1.3 (1.0-2.0)	146.2 (109.7-219.2)	6.6 (4.9-9.9)
B	18	2122.5	167.2 (125.5-250.7)	7.9 (5.9-11.8)	35.0 (26.3-52.5)	1.6 (1.2-2.5)	47.4 (35.6-71.1)	2.2 (1.7-3.4)	162.6 (122.0-243.8)	7.7 (5.7-11.5)
C	18	613.3	22.1 (16.6-33.1)	3.6 (2.7-5.4)	19.0 (14.3-28.5)	3.1 (2.3-4.6)	38.8 (29.1-58.1)	6.3 (4.7-9.5)	53.1 (39.8-79.6)	8.7 (6.5-13.0)
D	18	1806.2	111.6 (83.7-167.2)	6.2 (4.6-9.3)	60.1 (45.1-90.1)	3.3 (2.5-5.0)	102.8 (77.2-154.2)	5.7 (4.3-8.5)	154.2 (115.7-231.2)	8.5 (6.4-12.8)
E	18	1743.8	80.2 (60.2-120.2)	4.6 (3.5-6.9)	77.4 (58.1-116.0)	4.4 (3.3-6.7)	100.6 (75.5-150.9)	5.8 (4.3-8.7)	131.6 (98.8-197.3)	7.5 (5.7-11.3)

Table 10 demonstrates that the 3mL TVT lots were sufficiently precise for the CD45 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD16/CD56			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	358.1	22.9 (17.2-34.3)	6.4 (4.8-9.6)	11.2 (8.4-16.8)	3.1 (2.4-4.7)	21.9 (16.5-32.9)	6.1 (4.6-9.2)	33.5 (25.1-50.2)	9.4 (7.0-14.0)
B	17	484.1	36.3 (27.0-55.2)	7.5 (5.6-11.4)	37.4 (27.9-57.0)	7.7 (5.7-11.7)	28.1 (21.0-42.8)	5.8 (4.3-8.8)	57.6 (42.9-87.7)	11.9 (8.8-18.1)
C	18	153.5	5.2 (3.9-7.8)	3.4 (2.6-5.1)	7.6 (5.7-11.5)	5.0 (3.7-7.5)	10.0 (7.5-15.0)	6.5 (4.9-9.8)	14.7 (11.0-22.0)	9.6 (7.2-14.4)
D	18	275.1	12.3 (9.2-18.4)	4.5 (3.3-6.7)	14.2 (10.7-21.3)	5.2 (3.9-7.7)	19.1 (14.3-28.6)	6.9 (5.2-10.4)	29.1 (21.8-43.6)	10.6 (7.9-15.9)
E	18	402.0	26.4 (19.8-39.6)	6.6 (4.9-9.9)	16.1 (12.1-24.1)	4.0 (3.0-6.0)	20.3 (15.2-30.4)	5.0 (3.8-7.6)	34.7 (26.0-52.0)	8.6 (6.5-12.9)

Table 11 demonstrates that the 3mL TVT lots were sufficiently precise for the CD16/56 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

CD19			Between-Site		Between-Tube		Between-Replicate		Total	
Donor	N	Mean	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)	SD (95% CI)	% CV (95% CI)
A	18	351.7	25.5 (19.1-38.2)	7.2 (5.4-10.8)	1.9 (1.4-2.8)	0.5 (0.4-0.8)	5.2 (3.9-7.8)	1.5 (1.1-2.2)	31.2 (23.4-46.8)	8.9 (6.7-13.3)
B	17	141.9	7.5 (5.6-11.5)	5.4 (4.0-8.1)	6.2 (4.6-9.4)	4.4 (3.3-6.6)	8.8 (6.5-13.4)	6.2 (4.6-9.5)	14.2 (10.6-21.6)	10.1 (7.5-15.3)
C	18	53.7	0.5 (0.3-0.7)	0.8 (0.6-1.3)	0.9 (0.7-1.3)	1.7 (1.3-2.5)	3.2 (2.4-4.8)	6.0 (4.5-9.0)	4.0 (3.0-6.0)	7.4 (5.6-11.2)
D	18	90.4	6.2 (4.7-9.3)	6.9 (5.2-10.3)	5.9 (4.4-8.8)	6.5 (4.9-9.8)	5.9 (4.4-8.9)	6.6 (4.9-9.8)	10.8 (8.1-16.2)	11.9 (9.0-17.9)
E	18	97.7	6.2 (4.6-9.2)	6.3 (4.7-9.4)	0.1 (0.1-0.2)	0.1 (0.1-0.2)	8.9 (6.7-13.3)	9.1 (6.8-13.6)	10.9 (8.2-16.3)	11.2 (8.4-16.7)

Table 12 demonstrates that the 3mL TVT lots were sufficiently precise for the CD19 biomarker (individual and total %CVs were less than 10% and 15%, respectively).

Results showed that after evaluating the TVT investigational product for Between-Site, Between-Tube, and Between-Replicate variability across all biomarkers, it was sufficiently precise.

Equivalence- Method Comparisons against Becton Dickinson EDTA (BD EDTA Day 0, control) and predicate

A clinical study validated the stability of lymphocyte subsets (CD3, CD4, CD8, CD16/56, CD19 and CD45) in TVT tubes. Samples were collected 30 HIV positive donors and 12 normal donors into BD EDTA tubes (reference condition), TVT tubes and BCT tubes. All tube types underwent testing for all markers on Day 0 (within 6 hours of collection), and TVT and BCT tubes were assayed on Days 11 and 15 post collection. All samples at all time points were analyzed by flow cytometry using a single-platform method. Passing –Bablok regression was performed to assess the relationship between the measurement for each marker from each time point and the control BD EDTA tube.

Summary for HIV positive subjects as compared to control (n=30) (Absolute counts)
This analysis is BCT and TVT vs BD for each marker.

			Passing-Bablok Regression			
Marker	Tube	Time Interval	Intercept	Slope	95% CI for Slope	R
CD3	BCT	6 hour	-3.4	0.99	0.9478 to 1.039	1.00
	TVT	6 hour	-18.1	1.05	0.9773 to 1.142	0.99
	BCT	11 day	28.9	1.01	0.9071 to 1.074	0.99
	TVT	11 day	-31.7	1.05	0.9493 to 1.207	0.98
	BCT	15 day	52.2	0.95	0.8882 to 1.034	0.99
	TVT	15 day	-13.8	1.04	0.9425 to 1.154	0.97
CD4	BCT	6 hour	5.3	0.96	0.9325 to 1.013	1.00
	TVT	6 hour	0.6	1.02	0.9636 to 1.089	0.99
	BCT	11 day	1.9	0.96	0.9076 to 1.024	0.99
	TVT	11 day	11.5	0.97	0.9159 to 1.027	0.99
	BCT	15 day	2.4	0.99	0.9222 to 1.027	0.99
	TVT	15 day	2.1	0.98	0.8558 to 1.067	0.98
CD8	BCT	6 hour	-12.2	1.02	0.9467 to 1.074	1.00
	TVT	6 hour	-60.5	1.12	1.0481 to 1.196	1.00
	BCT	11 day	-0.3	1.04	0.9398 to 1.142	0.99
	TVT	11 day	-26.3	1.08	0.9823 to 1.191	0.98
	BCT	15 day	47.9	0.97	0.8793 to 1.055	0.99
	TVT	15 day	4.1	1.03	0.8790 to 1.179	0.97
CD16/56	BCT	6 hour	3.8	1.08	0.9451 to 1.189	0.98
	TVT	6 hour	1.5	1.05	0.9278 to 1.172	0.96
	BCT	11 day	4.1	1.10	0.9681 to 1.205	0.97
	TVT	11 day	10.3	0.96	0.7929 to 1.118	0.95
	BCT	15 day	20.3	0.96	0.8554 to 1.090	0.96
	TVT	15 day	15.7	0.95	0.8079 to 1.139	0.96
CD19	BCT	6 hour	0.4	1.01	0.9735 to 1.072	1.00
	TVT	6 hour	3.2	1.02	0.9361 to 1.078	0.99
	BCT	11 day	-5.8	1.05	0.9779 to 1.109	0.99
	TVT	11 day	-4.8	1.07	0.9437 to 1.149	0.98
	BCT	15 day	-2.2	0.96	0.8950 to 1.031	0.99
	TVT	15 day	-5.8	1.05	0.9489 to 1.123	0.99
CD45	BCT	6 hour	13.6	1.00	0.9501 to 1.049	1.00
	TVT	6 hour	-10.5	1.07	0.9978 to 1.153	0.99
	BCT	11 day	19.3	1.02	0.9435 to 1.101	0.99
	TVT	11 day	-32.5	1.05	0.9718 to 1.167	0.98
	BCT	15 day	9.4	1.00	0.9384 to 1.076	0.99
	TVT	15 day	5.3	1.05	0.9232 to 1.137	0.97

Dynamic range summary for HIV positive subjects (n=30) (Absolute counts):

Marker	Tube	Time Interval	Mean	Min	Max
CD3	BD	6 hour	1415.9	226.3	3741.1
CD4	BD	6 hour	520.3	12.5	1142.4
CD8	BD	6 hour	878.0	217.4	3017.8
CD16/56	BD	6 hour	227.6	33.2	656.6
CD19	BD	6 hour	199.7	0.2	520.7
CD45	BD	6 hour	1853.7	298.6	4556.0

Summary for Healthy Subjects (n=12) (Absolute counts)-
This analysis is BCT and TVT vs BD for each marker.

			Passing-Bablok Regression			
Marker	Tube	Time Interval	Intercept	Slope	95% CI for Slope	R
CD3	BCT	6 hour	75.9	0.92	0.7386 to 1.048	0.99
	TVT	6 hour	-14.3	1.03	0.9415 to 1.226	0.99
	BCT	11 day	189.6	0.83	0.6452 to 0.965	0.99
	TVT	11 day	-178.6	1.10	1.0392 to 1.445	0.99
	BCT	15 day	38.9	0.95	0.7709 to 1.107	0.99
	TVT	15 day	-69.5	1.05	0.9630 to 1.221	0.99
CD4	BCT	6 hour	33.4	0.94	0.8592 to 1.131	1.00
	TVT	6 hour	19.0	0.97	0.8749 to 1.209	0.99
	BCT	11 day	123.9	0.82	0.7653 to 0.925	0.99
	TVT	11 day	-76.7	1.04	0.9407 to 1.212	0.99
	BCT	15 day	66.0	0.88	0.8084 to 1.180	0.99
	TVT	15 day	-28.4	1.05	0.9592 to 1.303	0.99
CD8	BCT	6 hour	66.0	0.86	0.6987 to 0.976	0.99
	TVT	6 hour	20.5	0.99	0.5831 to 1.176	0.97
	BCT	11 day	35.3	0.91	0.7903 to 1.021	0.99
	TVT	11 day	32.8	0.90	0.4914 to 1.015	0.97
	BCT	15 day	37.2	0.98	0.8106 to 1.090	0.98
	TVT	15 day	48.1	0.90	0.4299 to 1.032	0.98
CD16/56	BCT	6 hour	23.4	0.95	0.5042 to 1.117	0.93
	TVT	6 hour	-23.0	1.10	0.6485 to 1.403	0.92
	BCT	11 day	-24.4	1.23	0.6715 to 1.528	0.90
	TVT	11 day	6.0	0.96	0.6636 to 1.311	0.89
	BCT	15 day	-30.2	1.19	0.8838 to 1.363	0.91
	TVT	15 day	-11.7	1.00	0.7030 to 1.377	0.90
CD19	BCT	6 hour	-4.1	1.06	0.8942 to 1.233	0.99
	TVT	6 hour	14.4	1.00	0.5285 to 1.238	0.98
	BCT	11 day	-1.6	0.97	0.8060 to 1.451	0.95
	TVT	11 day	2.7	0.99	0.7014 to 1.248	0.98
	BCT	15 day	-0.3	0.94	0.7719 to 1.258	0.97
	TVT	15 day	-5.0	1.08	0.8658 to 1.369	0.99
CD45	BCT	6 hour	131.5	0.92	0.5996 to 1.018	0.98
	TVT	6 hour	-78.1	1.05	0.8239 to 1.354	0.98
	BCT	11 day	295.4	0.82	0.5367 to 1.248	0.96
	TVT	11 day	-322.8	1.14	0.9225 to 1.427	0.97
	BCT	15 day	137.9	0.91	0.7036 to 1.095	0.97
	TVT	15 day	-42.4	1.04	0.7490 to 1.293	0.98

Dynamic range summary for Healthy Subjects (n=12) (Absolute counts):

Marker	Tube	Time Interval	Mean	Min	Max
CD3	BD	6 hour	1493.1	772.2	2819.4
CD4	BD	6 hour	953.6	493.8	2068.0
CD8	BD	6 hour	522.1	220.5	990.6
CD16/56	BD	6 hour	279.3	113.7	497.3
CD19	BD	6 hour	211.3	122.0	428.0
CD45	BD	6 hour	2009.0	1453.2	3452.4

Interference
One site recruited five healthy subjects (individuals with no known disease process and ≥21 years of age) and five HIV positive subjects. From each subject, two peripheral blood samples were collected in 4mL K3 EDTA Vacutainers. Immediately after collection, the 2x 4mL blood samples were split into seven 1mL aliquots.

- Aliquot 1) was treated as a control (no interfering substance). The other aliquots were manipulated as follows:
- Aliquot 2) had 2 µg/ml (0.2 mg/dL) bilirubin added to it.
- Aliquot 3) had 200 µg/ml (20 mg/dL) bilirubin added to it.
- Aliquot 4) had 0.025 g/ml (2.5 g/dL) hemoglobin added to it.
- Aliquot 5) had 0.035 g/ml (3.5 g/dL) hemoglobin added to it.
- Aliquot 6) had 1.5 mg/ml (150 mg/dL) triglycerides added to it.
- Aliquot 7) had 5 mg/ml (500 mg/dL) triglycerides added to it.

The aliquots were then stabilized using the appropriate amount of TransFix following the manufacturer's instructions, i.e., 0.2 mL TransFix administered to the 1mL aliquot, and were then stored at 2-8°C between test days. Aliquots were analyzed for a full lymphocyte count on Days 0, 11, and 15. The data indicated that there were no significant effects from the potential interferents listed above, as the results from testing Aliquots 2-7 were similar to results from the testing of Aliquot 1 (control).

807.92 (b)(3): Conclusions from Nonclinical and Clinical Testing
The TVT tubes were found to be safe and effective for the intended use.