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510(k) Summary

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Device Name:

Common name:	Cord Blood Transfer/Freezing Bag Set
Proprietary name:	Briostor™ Transfer/Freezing Bag Set
Classification Name:	Cord blood processing system and storage container, (21 CFR 864.9900)
Classification:	Class II (special controls)
FDA Product code:	OAO

Predicate device: Pall® Transfer/Freezing Bag Set (BK980027)

Intended Use:
The Pall® Briostor™ Transfer/Freezing Bag Set is intended to be used for cord blood processing and freezing.

Device description:
The Briostor Transfer/Freezing Bag Set is a disposable, empty, single use set with a sterile, non-pyrogenic fluid path. The device consists of two empty disposable transfer bags and a 5-chamber freezing bag integrally connected via tubing and tubing connectors, including Y sample sites. The set can be filled with a unit of previously collected cord blood via a blood spike and the connecting tubing. Also included is tubing terminating in a luer connector for addition of cryopreservative. The connectors, luer adapter, and spikes have protective caps that are discarded during use. The attached freezer bag is a general storage bag that is intended for cord blood processing and freezing.

Principle of Operation: The Briostor Transfer/Freezing Bag Set is a system that is operated manually similar to the predicate device. The source bag is connected to the set via a sterile

connection device or the transfer spike attached to the set. The source bag is then placed onto an expressor and the cord blood is transferred into the primary transfer bag. The source bag is detached and discarded. The primary transfer bag is then placed into a centrifuge and processed per established protocol. The supernatant is then expressed into the secondary transfer bag leaving the desired volume in the primary transfer bag. The secondary bag is discarded. The desired volume of cryopreservative is added per established protocol into the primary bag. Once the cryopreservative is added to the primary bag, the freezing bag is prepared to be filled. Once the freezing bag is filled, the tubing and chambers are sealed and the bag is frozen in liquid nitrogen temperatures per established protocol.

Indications for Use:
The proposed Pall Briostor™ Transfer/Freezing Bag Set has a similar intended use and indications for use statement as the predicate. The Briostor Transfer/Freezing Bag Set's intended use statement has been revised to meet the requirements of the Class II Special Controls Guidance Document: Cord Blood Processing System and Storage Container (March, 2011).

Predicates Intended Use Statement:
The Pall® Transfer/Freezing Bag Set is intended for use in the processing and freezing of blood components.

Intended Use:
The Pall® Briostor™ Transfer/Freezing Bag Set is intended to be used for cord blood processing and freezing.

Comparison of Technical Characteristics to the Predicate Device

The Briostor Transfer/Freezing Bag Set is composed of similar materials and design to the predicate device (with the exception of the freezing bag):

Element	Proposed Device Pall Briostor Transfer/Freezing Bag Set	Predicate Device (BK980027)
Sterile Fluid Path	Yes	Yes
Sterilization Method	Gamma Irradiation	Gamma Irradiation
Primary Transfer Bag	1 x PVC CLX® Plastic – 200 mL	1 x PVC CLX® Plastic – 200 mL
Secondary Transfer Bag	1 x PVC, HP Plastic – 200 mL	1 x PVC, HP Plastic – 150 mL
Freezing Bag material	Ethylene vinyl acetate (EVA)	Ethylene vinyl acetate (EVA)
Tubing	PVC, CLX plastic	PVC, CLX plastic
Luer Connector	Acrylic Polymer	Acrylic Polymer
Coaxial Y-connector	PVC, homopolymer	PVC, homopolymer
Clamp	Acrylonitrile butadiene	Acrylonitrile butadiene

	styrene (ABS)	styrene (ABS)
Blood Spike	Acrylonitrile butadiene styrene (ABS)	Acrylonitrile butadiene styrene (ABS)

The technological differences between the Briostor Transfer/Freezing Bag Set's proposed freezing bag and the predicate device's freezing bag are:

- The Briostor freezing bag is composed of 5 chambers rather than two chambers.
- The Briostor freezing bag and inlet tubing is manufactured using a (b) (4) process rather than a (b) (4) process to produce the freezing bag with an extruded inlet tubing. (b) (4) process as compared to the (b) (4) process employed by the (b) (4) method.
- The Briostor Freezing bag labeling is laser etched on the bag rather than ink printed which eliminates the necessity to print ink onto the bag's surface.
- The fill volume of the Briostor freezing bag is 20 mL vs 25 mL in the predicate device. This was necessary due to the size constraints of the cryo-freezing cassette into which the bag is placed and the requirement for 5 chambers.
- The volume of the secondary transfer bag is 200 mL vs 150 mL. This bag is discarded and was not revised based upon technical requirements.

Element	Proposed Device Pall® Briostor® Transfer/Freezing Bag Set	Predicate Device (BK980027)
Number of chambers	Five chambers	Two chambers
Freezing Bag fabrication	(b) (4) process	(b) (4) process
Inlet tubing	EVA (b) (4) tubing	Extruded EVA tubing
Freezing bag label	Laser etched	Ink - printed
Fill volume	20 ml	25 ml

Performance Testing (non-clinical):
The following tests were performed to demonstrate safety and effectiveness of the new Briostor Transfer/Freezing Bag Set with a five chamber (b) (4) freezing bag. Testing also demonstrates the equivalence to the predicate with reference to FDA's Guidance for Industry "Class II Special Controls Guidance Document: Cord Blood Processing System and Storage Container":

Performance Testing
Physical Strength Testing:
- Freeze and Thaw Testing
- Pressure Leak Testing
- Seal Leak Testing
- Drop Testing

Pull Testing
Handling at Liquid Nitrogen Temperature
X-Ray diffraction (XRD) Analysis (Crystallinity)

Stability/Shelf Life Testing
Microbial Ingress Study
Sterility and Bacterial Endotoxin Testing
Packaging Study
Integrity Testing at real time and accelerated ages.

1. Physical Strength Testing:
   The purpose of this study is to demonstrate and prove the robustness of the (b) (4) five chamber freezer bag design and transfer/freezing bag set by performing: 1) Freeze and Thaw testing of the freezer bag. 2) Integrity testing of the seal at each junction of the freezer bag. 3) RF seal integrity testing of the spike entry ports via pull testing. 4) Drop testing to demonstrate the durability of (b) (4) (b) (4) freezer bag.
   The test results indicate that the integrity and the robustness of the (b) (4) freezer bag of the seal was maintained during testing; therefore, demonstrates the robustness of the subject device by meeting the acceptance criteria of this protocol.

2. Evaluation of Proposed 5-Chamber Freezer Bag as Compared to Current 2-Chamber Freezer Bag
   This study evaluated and compared processing and handling and the post-thaw cord blood quality between the current 2-chamber freezing bag and the proposed 5-chamber freezing bag. Post-thaw quality assessment includes TNC counts, % viability, % CD34+, and CFC assays. The data demonstrated that no statistically significant difference was found between the post-thaw quality assessments. Based on these findings, it is concluded that the proposed 5-chamber freezing bag is equivalent to the current 2-chamber freezing bag in processing, handling, and performance.

3. Integrity Testing and Thickness Comparison for New 5 Chamber Freezing Bag vs. Existing 2 Chamber Freezing Bag
   The 5 chamber freezer bag was tested and compared to the 2 chamber freezer bag for thickness and integrity under various handling situations. Bags were tested as manufactured under normal protocols and after double gamma irradiation dosages. Both dosing conditions were tested for leak and burst strength, both with and without undergoing a liquid nitrogen freeze/thaw process. Although a significant increase in the integrity of the 5 chamber bag was seen in the burst strength, no significant difference were seen in either of

the designs due to undergoing a freeze/thaw process, nor was there any significant difference in the 5 chamber bags after a double sterilization cycle.

4. Physical Strength Testing

   Testing demonstrated that the 5 chamber bag was stronger than the 2 chamber bag when testing for physical strength. Four sample groups were evaluated with a focus on determining differences between 2 chamber and 5 chamber specimens and between samples that had undergone a single freeze/thaw cycle as compared to those samples that had not. Gel permeation chromatography results indicated that the 5 chamber bags are made from a (b) (4) (b) (4) polymer than the 2 chamber bags. The dynamic mechanical analysis results indicate that there are some significant differences between the 2 chamber specimens and the 2 chamber freeze/thaw specimens as well as the 2 chamber freeze/thaw specimens and both groups of 5 chamber specimens. Puncture resistance results showed more complex differences with the broad trend of statistically significant differences between the 2 chamber and 5 chamber specimens. The 5 chamber specimens had higher values for all parameters mentioned in this testing. All specimens from all four sample groups passed the water vapor permeability and leak resistance testing.

5. X-Ray Diffraction (XRD) Analysis: Crystallinity:

   The purpose of this study was to use x-ray diffraction to determine the crystallinity of two EVA co-polymer bags. The results indicate there is no significant difference in the amount of crystalline materials in these samples of the (b) (4) 5 chamber bag and the (b) (4) 2 chamber bag.

6. Stability Study

   Five chamber freezer bag stability was tested on 3 and 6 month real time aged and 3 month and 1 year accelerated aged samples. Samples were tested for pyrogen, tissue toxicity, sterility, product packaging integrity, product physical integrity, product performance before and after freeze and thaw. Results indicate that the 5 chamber bag system remains stable and sterile for all time points tested. Studies are ongoing to provide 3 years of real time data at the conclusion of the study.

7. Sterilization Validation Reports

   The device was validated in accordance with ANSI/AAMI/ISO 11137-2:2012. Sterilization was validated for the 5 chamber bag systems using a bacterial growth test after a 14 day incubation period. No growth was found in any of the samples. Testing was based upon USP 36 Chapter <71> Sterility Tests, 2013 and AAMI/ISO 11737:2009 Sterilization of medical devices–

Microbiological methods–Part 2: Test of sterility performed in the definition, validation and maintenance of a sterilization process.

8. Bacterial Endotoxins Test Report

   Bacterial endotoxin was tested using the kinetic chromogenic LAL test. Results are well below the level of 20EU/device for medical devices. Testing was based upon USP 36 Chapter <85> Bacterial Endotoxins Test, 2011 and Chapter <161> Medical Devices—Bacterial Endotoxin and Pyrogen Tests. ANSI/AAMI ST72:2011, Bacterial Endotoxins – Test methodologies, routine monitoring and alternatives to batch testing, Guidance for Industry, Pyrogen and Endotoxin Testing: Questions and Answers, June 2012 Compliance.

9. Microbial Ingress Study

   Test articles were challenged with a suspension of *Brevundimonas diminuta* (ATCC 19146). After contact time for 2 hours at room temperature, all test and control articles were incubated at 30-35 C for 14 days. No growth was observed from the test articles after day 14. This study was based upon the following references: United States Pharmacopeia 36, National Formulary 31, 2013 <71> Steriity Tests. ANSI/AAMI/ISO 11607-01:2006/(R)2010, Packaging for Terminally Sterilized Medical Devices – Part 1: Requirement for Materials, Sterile Barrier Systems, and Packaging Systems. ANSI/AAMI/ISO 11607-02:2006/(R)2010, Packaging for Terminally Sterilized Medical Devices – Part 2: Validation Requirements for Forming, Sealing, and Assembly Processes.

10. Biocompatibility

Biocompatibility evaluation for the Briostor Transfer/Freezing Bag Set was conducted in accordance with the FDA Blue Book Memorandum #G95-1 “Use of International Standard ISO-10993, Biological Evaluation of Medical Devices Part 1: Evaluation and Testing: May 1, 1995, and the International Standard ISO 10993-1 “Biological Evaluation of Medical Devices Part 1: Evaluation and Testing Within a Risk Management Process” as recognized by FDA.
The Briostor Transfer/Freezing Bag Set is categorized as an “External Communicating Device, Blood path indirect, prolonged exposure, similar to the predicate device.

The battery of testing include:

L929 MEM Elution – ISO 10993-5:2009
Kligman Guinea Pig Maximization Test – 2 extracts – ISO 10993-10:2010
Intracutaneous Injection – 2 extracts – ISO 10993-10:2010
Systemic Injection Test – 2 extracts – ISO-10993-11:2006
Rabbit Pyrogen Test - Material Mediated – ISO 10993-11:2006

Hemolysis- Rabbit Blood – ASTM Direct Contact, ASTM F 756 – 08: Standard Practice for the Assessment of Hemolytic Properties of Materials, 2008
Prothrombin Time Assay – Indirect and Direct Contact – ISO 10993-4:2002
Unactivated Partial Thromboplastin Time Assay – Indirect and Direct Contact – ISO 10993-4:2002
Complement Activation Assay- Indirect and Direct Contact – ISO 10993-4:2002
Physiochemical Test for Plastics – USP 36, National Formulary 31, 2013. Monograph <661> Containers, Physiochemical Tests - Plastics

Conclusion:
Based on the materials used, indications for use, and the non-clinical performance and physical integrity testing of the subject device all testing demonstrate that the physical and chemical properties of the subject device are as safe and effective as the predicate device and supports the substantial equivalence to the predicate device that is currently marketed by Pall Corporation for the same intended use.