

## 510K Summary (K094018)

**Submitter:**

Biocompatibles UK Ltd.  
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United Kingdom

APR 16 2010

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**Contact:**

Dr. Alistair Taylor, Director of Quality and Regulatory Affairs

### 1 Common name, Trade name(s) & Classification

Trade name(s): LC Bead Microspheres & BeadBlock Microspheres

Common name(s) & Codes:

Vascular Embolization Device, embolization, arterial (Code: KRD)

Neurovascular Embolization Device, artificial embolization (Code: HCG)

### 2 510(k) Numbers and Product Codes of equivalent devices.

Biocompatibles UK Ltd  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number: K033761  
Product Code: HCG/KRD  
**CFR Section: 882.5950**

Biocompatibles UK Ltd.  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number(s): K042231/K083091  
Product Code: HCG/KRD  
**CFR Section: 870.3300/882.5950**

### 3 Indications for Use and Intended Population

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

### 4 Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range.

LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in the table. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

Product	Volume of beads (mL)	Volume PBS (mL)	Total volume (mL)
LC Bead Microspheres	1	7	8
	2	6	8
Bead Block Compressible Microspheres	1	5	6
	2	4	6

LC Bead/Bead Block product configurations.

### 5 Similarities and Differences to Predicates

The intended use of LC Bead/Bead Block and the predicate device are the same and unchanged. Biocompatibles UK Ltd intend to market LC Bead with an additional SKU in the size range of 70-150µm. Only minor process modifications were made to allow for the

production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

## 6 Physical Properties and Characteristics

LC Bead & Bead Block are preformed, soft, deformable microspheres which consist of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Compressed beads will recover to their original size (e.g. when compressed passing through a catheter, the beads will return to their original size after exiting the catheter). This Pre-Market notification adds the size range of 70-150µm for the blue dyed version of LC Bead. Both products are supplied in a variety of size ranges as follows:

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
EB1S103	100-300	1	5
EB1S305	300-500	1	5
EB1S507	500-700	1	5
EB1S709	700-900	1	5
EB1S912	900-1200	1	5
EB2S103	100-300	2	4
EB2S305	300-500	2	4
EB2S507	500-700	2	4
EB2S709	700-900	2	4
EB2S912	900-1200	2	4

Bead Block available size ranges

Product Code	Size Range (µm)	Quantity LC Bead (mL)	Quantity PBS (mL)
UB1V103	100-300	1	7
UB1V305	300-500	1	7
UB1V507	500-700	1	7
UB1V709	700-900	1	7
UB1V912	900-1200	1	7
UB2V103	100-300	2	6
UB2V305	300-500	2	6
UB2V507	500-700	2	6
UB2V709	700-900	2	6
UB2V912	900-1200	2	6

LC Bead (undyed) available size ranges

Product Code	Size Range ( $\mu\text{m}$ )	Quantity LC Bead (mL)	Quantity PBS (mL)
VE110GS	70-150	1	7
VE210GS	100-300	1	7
VE410GS	300-500	1	7
VE610GS	500-700	1	7
VE810GS	700-900	1	7
VE1010GS	900-1200	1	7
VE120GS	70-150	2	6
VE220GS	100-300	2	6
VE420GS	300-500	2	6
VE620GS	500-700	2	6
VE820GS	700-900	2	6
VE1020GS	900-1200	2	6

LC Bead (dyed) available size ranges

### 6.1 Differences between LC Bead and Bead Block

Bead Block is dyed blue using an FDA approved dye (used in contact lenses) to aid in the visualization of the microspheres in the delivery syringe (LC Bead are available as blue and in natural color). Bead Block is provided in a polycarbonate sterile syringe, LC Bead is provided in a sterile glass vial. The primary difference between LC Bead and Bead Block products, aside from the packaging relates to the degree of functionalisation of the macromer and the ratios of initiators used in the reaction which results in differences in the degree of crosslinking of the polymer in the microspheres.

This pre-market notification relates only to the addition of a size fraction for LC Bead in the range of 70-150 $\mu\text{m}$  which is a subgroup of the currently marketed LC Bead 100-300 $\mu\text{m}$  product and the 70-150 $\mu\text{m}$  size specification falls within that of the cleared 100-300  $\mu\text{m}$  LC Bead size range. Please refer to Section 8: In-Vitro testing for further product characterization information. There is no change to the product supplied under the Bead Block trade name.

## 7 Summary of Non-clinical data

LC Bead and Bead Block have been tested in pre-clinical models for biocompatibility and safety in accordance with the FDA Guidance for Industry and staff; Class II Special Controls Guidance Document: Vascular and Neurovascular Embolization Devices.

### 7.1 Tests of Biocompatibility

Tests for biocompatibility were conducted in accordance with ISO 10993 parts 1, 3, 4, 6, 10 and 11 (listed in section 9), the products conform to the relevant requirements of these standards.

<b>Biocompatibility Test</b>	<b>Pass/Fail</b>
Genotoxicity: In Vitro Chromosomal Aberration Study in Mammalian Cells	Pass
Mouse Bone Marrow Micronucleus Study	Pass
In Vitro Hemolysis Study (Modified ASTM-Direct Contact Method)	Pass
ISO Muscle Implantation Study in the Rabbit	Pass
Cytotoxicity Study using the ISO Elution Method	Pass
ISO Sensitization Study in the Guinea Pig	Pass
ISO Acute Intracutaneous Reactivity Study in the Rabbit	Pass
Chronic Toxicity Study in the Rat following Subcutaneous Implantation (13 weeks)	Pass
Subchronic Intravenous Toxicity Study in the Rat (14 day, saline extract)	Pass
Genotoxicity: Bacterial Reverse Mutation Study	Pass
ISO Acute Systemic Toxicity Study in the Mouse (liquid/chemical)	Pass
ISO Surgical Muscle Implantation in the Rabbit (26 weeks)	Pass

## 7.2 Pre-clinical testing in a large animal model

### Summary of the Evaluation of LC Bead (formerly Gelspheres) Embolic Agent in a Swine Embolization Model

The purpose of this study was to evaluate, characterize and compare the performance of LC Bead Embolic Agent (n=36) and Embosphere® microspheres (n=36) in a swine bilateral partial renal artery embolization model in order to assess the ability of these agents to occlude the vessel.

The primary outcomes for this study were assessment of:

- (1) recanalization of the vessels, and,
- (2) local and systemic foreign body tissue reactions.

The secondary outcomes were assessment of:

- (1) ease of delivery of the embolic agent,
- (2) the occurrence of blood vessel rupture
- (3) non-target embolization/device migration.

LC Bead Embolic Agent and Embospheres microspheres performed in a substantially equivalent manner at 2, 7 and 28 days for all parameters except recanalization, where LC Bead appears to have an advantage of having a more durable embolization effect. The tissue reaction for both LC Bead and Embospheres was very mild and was essentially the same. Both embolic agents delivered easily, but Embospheres had six cases of catheter clogging out of 36 cases. There was

only one case of catheter clogging with LC Bead. There were no incidents of blood vessel rupture during the embolization procedures. There was one case of unexplained non-target embolization with Embospheres and none with LC Bead. Alternatively, there was one potential case of device migration with LC Bead and none with Embospheres.

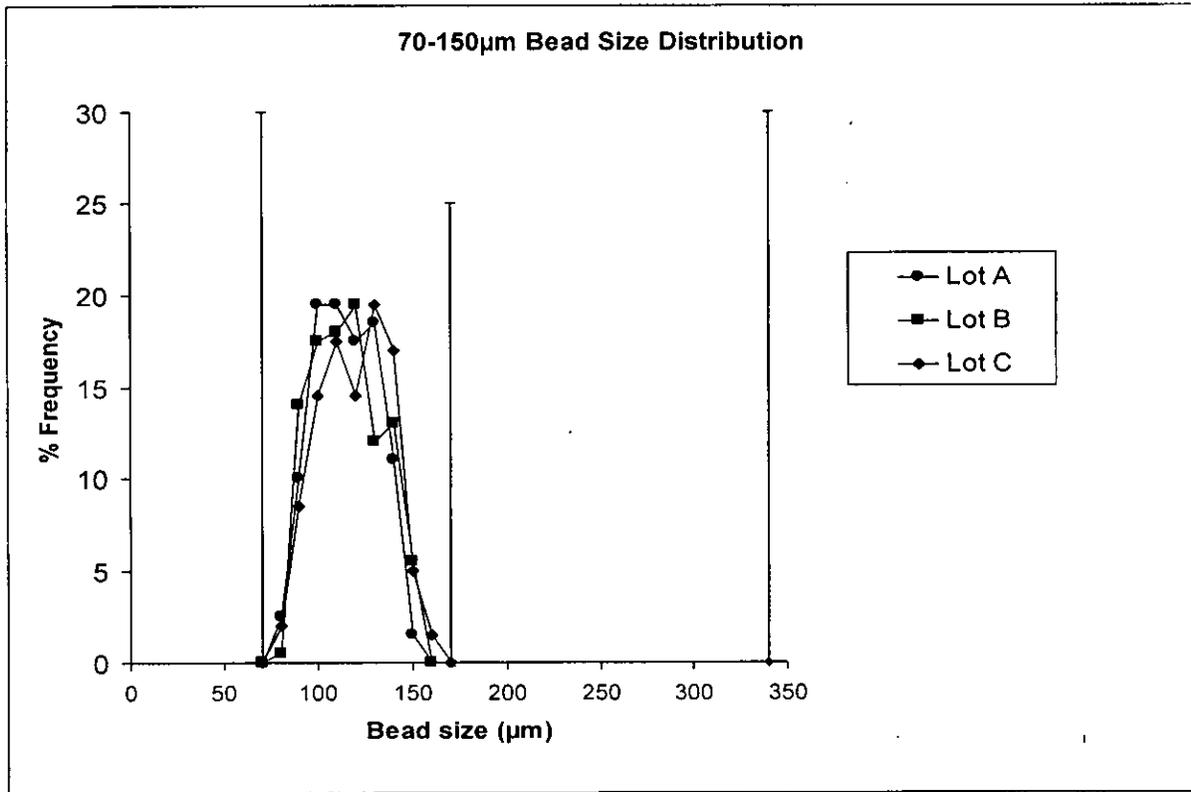
## 8 Summary of In-Vitro testing

Both LC Bead and Bead Block have been extensively tested and subject to product and process validation and verification testing. A summary of key characteristics for which test data has been provided in this 510K, are described in this section.

### 8.1 Size distribution

Data was provided in this pre market notification regarding the verification and validation of the new size range of LC Bead. The table and illustration below provide the results of these tests and demonstrate that all product met specification with respect to bead size.

Product	Sizing Specification	Fibres Specification
Current LC Bead 100-300µm	Pass	Pass
LC Bead 70-150µm	Pass	Pass



## 8.2 Compressibility

LC Bead has equivalent compressibility to other marketed embolic agents.

## 8.3 Catheter Delivery

Catheter delivery characteristics have been tested in accordance with a written protocol to assure performance with typical microcatheters. The table below provides a summary of the test results for the current marketed LC Bead product and the 70-150µm size fraction.

Catheter ID		Microcatheter Name	LC Bead/ size ranges (µm)				
(inches)	(µm)		70-150	100-300	300-500	500-700	700-900
0.024	610	5Fr. Angio Dynamics	✓	✓	✓	✓	✓
0.024	610	FasTracker® 325	✓	✓	✓	✓	✓
0.021	540	FasTracker® 18	✓	✓	✓	✓	
0.021	540	Cook 3.0 Fr	✓	✓	✓	✓	
0.016	420	Prowler® 14	✓	✓	✓		
0.022	570	2.4Fr Progreat™ Terumo	✓	✓	✓		
0.018	457	Spinnaker Elite1.8	✓	✓	✓		

✓	Catheter can be used for the effective delivery of the LC Bead product.
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#### 8.4 Other tests

Additional bead characterization data has been provided in this pre-market notification with respect to other attributes of the device. A summary of this additional test data is provided below.

Test	Pass/Fail
<p><b>Residual starting materials</b>  <i>The residual starting materials present in the final packaged device.</i></p>	Pass
<p><b>Residual solvents</b>  <i>The residual solvent levels present in the final packaged device.</i></p>	Pass
<p><b>Product visual inspection for presence of fibres</b>  <i>The visual assessment of a sample of the final product to determine the level of fibres present.</i></p>	Pass
<p><b>Product catheter deliverability</b>  Bead Aggregation/Clogging:  <i>The incidence of any unintended bead aggregation in the syringe resulting in catheter blockage is assessed during catheter delivery testing.</i>  Ease of Delivery:  <i>The ease of delivery is assessed as part of catheter delivery testing and must be considered "not difficult" in order to pass this test.</i>  Shape after embolic after injection:  <i>The shape of the embolic agent is evaluated after catheter delivery using optical microscopy.</i>  Bead Deliverability:  <i>The ability to deliver the whole vial of beads mixed with contrast agent through a catheter as described in the Instructions for Use.</i>  Levels of broken or bead fragments after catheter delivery:  <i>The presence of broken is evaluated after catheter delivery using optical microscopy.</i></p>	Pass
<p><b>Time to Suspension Studies</b>  <i>The time taken for the beads to form a stable homogeneous suspension when mixed with the recommended ratio of contrast agent and saline/water</i></p>	Pass
<p><b>Bead aspiration from vial</b>  <i>The ease of removing the beads from the primary packaging using standard syringes and needles as described in the Instructions for Use.</i></p>	Pass
<p><b>Bead sizing</b>  <i>The size of the beads after packaging and sterilisation.</i></p>	Pass
<p><b>pH Testing</b>  <i>The pH of the final packing solution after sterilisation.</i></p>	Pass

## 9 Performance Standards

LC Bead/Bead Block Compressible Microspheres meet the following Performance Standards:

- Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products.
- ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing.
- ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.
- ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.
- ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.
- ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.
- ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.
- ISO/EN 11607; 1997 – Packaging for terminally sterilized products.
- AAMI 17665-1; 2006 – Sterilization of Health Care Products Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ANSI/AAMI/ISO 14937; 2009 – Sterilization of Health Care Products Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.
- ISO 14971; 2007 – Medical Devices – Application of Risk Management

### 9.1 Conclusion

There are more similarities than differences between the predicate device and the LC Bead/Bead Block products. This Premarket Notification explains the minor revisions made to the manufacturing process to enable production of the additional smaller diameter SKU which is a subset of the currently cleared 100-300 LC Bead product. The primary packaging, indications for use, specifications and chemistry are unchanged from K033761/K042231/K083091. The predicate device and LC Bead/Bead Block products have the same intended use, warnings and contraindications. The predicate device and LC Bead/Bead Block products are identical other than the added size range, in design, and unchanged from the predicate device. When used in

accordance with the instructions for use, by qualified personnel, the LC Bead/Bead Block products are safe and effective, as indicated, for the intended use.



DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration  
10903 New Hampshire Avenue  
Document Mail Center - WO66-G609  
Silver Spring, MD 20993-0002

Biocompatibles UK Ltd.  
c/o Mr. John Greenbaum  
President  
Generic Devices Consulting, Inc.  
20310 SW 48<sup>th</sup> Street  
Ft. Lauderdale, FL 33332

APR 1 6 2010

Re: K094018

Trade/Device Name: LC Bead/Bead Block™ Compressible Microspheres  
Regulation Number: 21 CFR 882.5950  
Regulation Name: Neurovascular Embolization Device  
Regulatory Class: Class II  
Product Code: HCG  
Dated: March 12, 2010  
Received: March 17, 2010

Dear Mr. Greenbaum:

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.

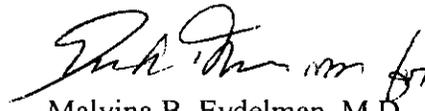
Page 2 - Mr. John Greenbaum

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); 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 regulation (21 CFR Part 801), please go to <http://www.fda.gov/AboutFDA/CentersOffices/CDRH/CDRHOffices/ucm115809.htm> for the Center for Devices and Radiological Health's (CDRH's) Office of Compliance. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 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 Small Manufacturers, International and Consumer Assistance 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,



Malvina B. Eydelman, M.D.  
Director  
Division of Ophthalmic, Neurological,  
and Ear, Nose and Throat Devices  
Office of Device Evaluation  
Center for Devices and  
Radiological Health

Enclosure

510(k) Number(if known): K094018

Device Name:

**LC Bead Microspheres  
Bead Block™ Compressible Microspheres**

Indications For Use:

***"LC Bead Microspheres & Bead Block™ Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

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Prescription Use X OR Over-The-Counter Use     

(Per 21 CFR 801.109)

PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF  
NEEDED)

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Concurrence of CDRH, Office of Device Evaluation (ODE)

(Optional Format 1-2-96)

Quynh Hoang

(Division Sign-Off)

Division of Ophthalmic, Neurological and Ear,  
Nose and Throat Devices

510(k) Number K094018



DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration  
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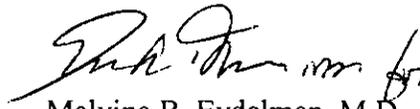
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Director  
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Enclosure

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Concurrence of CDRH, Office of Device Evaluation (ODE)

(Optional Format 1-2-96)

Quynh Hoang

(Division Sign-Off)

Division of Ophthalmic, Neurological and Ear,  
Nose and Throat Devices

510(k) Number K094018



U.S. Food and Drug Administration  
Center for Devices and Radiological Health  
Document Mail Center – WO66-G609  
10903 New Hampshire Avenue  
Silver Spring, MD 20993-0002

March 17, 2010

BIOCOMPATIBLES U.K. LIMITED  
C/O GENERIC DEVICES CONSULTING, INC.  
20310 SW 48TH STREET  
FT. LAUDERDALE, FLORIDA 33332  
UNITED STATES  
ATTN: JOHN GREENBAUM

510k Number: K094018

Product: LC BEAD MICROSPHERES, BEAD BLO

The additional information you have submitted has been received.

We will notify you when the processing of this submission has been completed or if any additional information is required. Please remember that all correspondence concerning your submission MUST be sent to the Document Mail Center at the above letterhead address. Correspondence sent to any address other than the one above will not be considered as part of your official premarket notification submission. Also, please note the new Blue Book Memorandum regarding Fax and E-mail Policy entitled, "Fax and E-Mail Communication with Industry about Premarket Files Under Review. Please refer to this guidance for information on current fax and e-mail practices at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm089402.htm>. On August 12, 2005 CDRH issued the Guidance for Industry and FDA Staff: Format for Traditional and Abbreviated 510(k)s. This guidance can be found at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm084365.htm>. Please refer to this guidance for assistance on how to format an original submission for a Traditional or Abbreviated 510(k).

The Safe Medical Devices Act of 1990, signed on November 28, states that you may not place this device into commercial distribution until you receive a letter from FDA allowing you to do so. As in the past, we intend to complete our review as quickly as possible. Generally we do so in 90 days. However, the complexity of a submission or a requirement for additional information may occasionally cause the review to extend beyond 90 days. Thus, if you have not received a written decision or been contacted within 90 days of our receipt date you may want to check with FDA to determine the status of your submission.

**Please ensure that whether you submit a 510(k) Summary as per 21 CFR 807.92, or a 510(k) Statement as per 21 CFR 807.93, it meets the content and format regulatory requirements.**

If you have procedural questions, please contact the Division of Small Manufacturers International and Consumer Assistance (DSMICA) at (301)796-7100 or at their toll-free number (800)638-2041, or contact the 510k staff at (301)796-5640.

Sincerely,

510(k) Staff



U.S. Food and Drug Administration  
Center for Devices and Radiological Health  
Document Mail Center – WO66-G609  
10903 New Hampshire Avenue  
Silver Spring, MD 20993-0002

January 28, 2010

BIOCOMPATIBLES U.K. LIMITED  
C/O GENERIC DEVICES CONSULTING, INC.  
20310 SW 48TH STREET  
FT. LAUDERDALE, FLORIDA 33332  
UNITED STATES  
ATTN: JOHN GREENBAUM

510k Number: K094018

Product: LC BEAD MICROSPHERES, BEAD BLO

We are holding your above-referenced Premarket Notification (510(k)) for 30 days pending receipt of the additional information that was requested by the Office of Device Evaluation. Please remember that all correspondence concerning your submission MUST cite your 510(k) number and be sent in duplicate to the Document Mail Center at the above letterhead address. Correspondence sent to any address other than the one above will not be considered as part of your official premarket notification submission. Also, please note the new Blue Book Memorandum regarding Fax and E-mail Policy entitled, "Fax and E-Mail Communication with Industry about Premarket Files Under Review. Please refer to this guidance for information on current fax and e-mail practices at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm089402.htm>.

The deficiencies identified represent the issues that we believe need to be resolved before our review of your 510(k) submission can be successfully completed. In developing the deficiencies, we carefully considered the statutory criteria as defined in Section 513(i) of the Federal Food, Drug, and Cosmetic Act for determining substantial equivalence of your device. We also considered the burden that may be incurred in your attempt to respond to the deficiencies. We believe that we have considered the least burdensome approach to resolving these issues. If, however, you believe that information is being requested that is not relevant to the regulatory decision or that there is a less burdensome way to resolve the issues, you should follow the procedures outlined in the "A Suggested Approach to Resolving Least Burdensome Issues" document. It is available on our Center web page at: <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/MedicalDeviceProvisionsofFDAModernizationAct/ucm136685.htm>.

If after 30 days the additional information (AI), or a request for an extension of time, is not received, we will discontinue review of your submission and proceed to delete your file from our review system (21 CFR 807.87(l)). Please note our guidance document entitled, "Guidance for Industry and FDA Staff, FDA and Industry Actions on Premarket Notification (510(k)) Submissions: Effect on FDA Review Clock and Performance Assessment". If the submitter does submit a written request for an extension, FDA will permit the 510(k) to remain on hold for up to a maximum of 180 days from the date of the AI request. The purpose of this document is to assist agency staff and the device industry in understanding how various FDA and industry actions that may be taken on 510(k)s should affect the review clock for purposes of meeting the Medical Device User Fee and Modernization Act. You may review this document at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm089735.htm>. Pursuant to 21 CFR 20.29, a copy of your 510(k) submission will remain in the Office of Device Evaluation. If you then wish to resubmit this 510(k) notification, a new number will be assigned and your submission will be considered a new premarket notification submission.

Please remember that the Code of Federal Regulations (CFR) states that you may not place this device into commercial distribution until you receive a decision letter from FDA allowing you to do so.

If you have procedural questions, please contact the Division of Small Manufacturers International and Consumer Assistance (DSMICA) at (301)796-7100 or at their toll-free number (800)638-2041, or contact the 510k staff at (301)796-5640.

Sincerely yours,

Marjorie Shulman  
Consumer Safety Officer  
Premarket Notification Section  
Office of Device Evaluation  
Center for Devices and Radiological Health



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

U.S. Food and Drug Administration  
Center for Devices and Radiological Health  
Document Mail Center – WO66-G609  
10903 New Hampshire Avenue  
Silver Spring, MD 20993-0002

December 31, 2009

BIOCOMPATIBLES U.K. LIMITED  
C/O GENERIC DEVICES CONSULTING, INC.  
20310 SW 48TH STREET  
FT. LAUDERDALE, FLORIDA 33332  
UNITED STATES  
ATTN: JOHN GREENBAUM

510k Number: K094018

Received: 12/29/2009

Product: LC BEAD MICROSPHERES, BEAD BLO

The Food and Drug Administration (FDA), Center for Devices and Radiological Health (CDRH), has received the Premarket Notification, (510(k)), you submitted in accordance with Section 510(k) of the Federal Food, Drug, and Cosmetic Act (Act) for the above referenced product and for the above referenced 510(k) submitter. Please note, if the 510(k) submitter is incorrect, please notify the 510(k) Staff immediately. We have assigned your submission a unique 510(k) number that is cited above. Please refer prominently to this 510(k) number in all future correspondence that relates to this submission. We will notify you when the processing of your 510(k) has been completed or if any additional information is required. **YOU MAY NOT PLACE THIS DEVICE INTO COMMERCIAL DISTRIBUTION UNTIL YOU RECEIVE A LETTER FROM FDA ALLOWING YOU TO DO SO.**

Please remember that all correspondence concerning your submission **MUST** be sent to the Document Mail Center (DMC) at the above letterhead address. Correspondence sent to any address other than the one above will not be considered as part of your official 510(k) submission.

On September 27, 2007, the President signed an act reauthorizing medical device user fees for fiscal years 2008 - 2012. The legislation - the Medical Device User Fee Amendments of 2007 is part of a larger bill, the Food and Drug Amendments Act of 2007. Please visit our website at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/MedicalDeviceUserFeeandModernizationActMDUFMA/default.htm>

for more information regarding fees and FDA review goals. In addition, effective January 2, 2008, any firm that chooses to use a standard in the review of ANY new 510(k) needs to fill out the new standards form (Form 3654) and submit it with their 510(k). The form may be found at <http://www.fda.gov/AboutFDA/ReportsManualsForms/Forms/default.htm>.

We remind you that Title VIII of the Food and Drug Administration Amendments Act of 2007 (FDAAA) amended the PHS Act by adding new section 402(j) (42 U.S.C. § 282(j)), which expanded the current database known as ClinicalTrials.gov to include mandatory registration and reporting of results for applicable clinical trials of human drugs (including biological products) and devices. Section 402(j) requires that a certification form <http://www.fda.gov/AboutFDA/ReportsManualsForms/Forms/default.htm> accompany 510(k)/HDE/PMA submissions. The agency has issued a draft guidance titled: "Certifications To Accompany Drug, Biological

Product, and Device Applications/Submissions: Compliance with Section 402(j) of The Public Health Service Act, Added By Title VIII of The Food and Drug Administration Amendments Act of 2007”  
<http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/HowtoMarketYourDevice/PremarketSubmissions/PremarketNotification510k/ucm134034.htm>. According to the draft guidance, 510(k) submissions that do not contain clinical data do not need the certification form.

Please note the following documents as they relate to 510(k) review: 1) Guidance for Industry and FDA Staff entitled, “Interactive Review for Medical Device Submissions: 510(k)s, Original PMAs, PMA Supplements, Original BLAs and BLA Supplements”. This guidance can be found at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm089402.htm>. Please refer to this guidance for information on a formalized interactive review process. 2) Guidance for Industry and FDA Staff entitled, "Format for Traditional and Abbreviated 510(k)s". This guidance can be found at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm084365.htm>. Please refer to this guidance for assistance on how to format an original submission for a Traditional or Abbreviated 510(k).

In all future premarket submissions, we encourage you to provide an electronic copy of your submission. By doing so, you will save FDA resources and may help reviewers navigate through longer documents more easily. Under CDRH's e-Copy Program, you may replace one paper copy of any premarket submission (e.g., 510(k), IDE, PMA, HDE) with an electronic copy. For more information about the program, including the formatting requirements, please visit our web site at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/HowtoMarketYourDevice/PremarketSubmissions/ucm134508.html>. In addition, the 510(k) Program Video is now available for viewing on line at <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/HowtoMarketYourDevice/PremarketSubmissions/PremarketNotification510k/ucm070201.htm>.

Lastly, you should be familiar with the regulatory requirements for medical devices available at Device Advice <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/default.htm>. If you have questions on the status of your submission, please contact DSMICA at (301)796-7100 or the toll-free number (800)638-2041, or at their internet address <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/default.htm>. If you have procedural questions, please contact the 510(k) Staff at (301)796-5640.

Sincerely,

510(k) Staff

80

K094018

# Generic Devices Consulting, Inc.

**John Greenbaum**

20310 SW 48<sup>th</sup> Street  
Ft. Lauderdale, FL. 33332  
Fax (954) 653-1153  
Phone (954) 680-2548  
Mobile (954) 610-0161  
Email: genericd@bellsouth.net

FDA CDRH OCE

DEC 29 2009

RECEIVED

December 18, 2009

Office of Device Evaluation  
Document Mail Center (HFZ-401)  
Center for Devices and Radiological Health  
Food and Drug Administration  
9200 Corporate Blvd  
Rockville, Maryland 20850

DEC 29 2009

RE: Special 510K modifications.

Dear Sir/Madam,

Please find enclosed, a Premarket Notification for LC Bead/Bead Block™ Compressible Microspheres on behalf of Biocompatibles UK Ltd.

Biocompatibles is the primary manufacturer and distributor for LC Bead/Bead Block Compressible Microspheres.

In this Premarket Notification, Biocompatibles UK Ltd intends to market an additional SKU of beads in the size range of 70–150µm, which is a subset of the legally marketed, existing SKU of 100-300µm. There is no substantive change to the device technology, chemistry, target population, or indications for use. Changes are made only in the addition of the SKU and manufacturing process changes to achieve this size range. Therefore, this Premarket Notification is a Special 510K modification, in accordance with FDA Guidance on 510K filings.

In addition, it is noted that this Premarket Notification is intended (as they exist with the legally marketed predicate) for clearance for Product Codes KRD (§ 870.3300) and HCG (§ 882.5950).

Generic Devices Consulting (John Greenbaum) is the U.S. Foreign Agent for Biocompatibles UK Ltd and is the official correspondent for this Premarket Notification. Biocompatibles has a payment account established and a check for the filing fee for this Premarket Notification has been sent with the User Fee Coversheet in the front of the Premarket Notification.

This letter also certifies that the E-copy of this Premarket Notification is identical to the original.

Please do not hesitate to call if you have any questions or need additional information.

Sincerely,



John Greenbaum

K29

## Generic Devices Consulting, Inc.

**John Greenbaum**

20310 SW 48<sup>th</sup> Street  
Ft. Lauderdale, FL. 33332  
Fax (954) 653-1153  
Phone (954) 680-2548  
Mobile (954) 610-0161  
Email: genericd@bellsouth.net

December 18, 2009

Office of Device Evaluation  
Document Mail Center (HFZ-401)  
Center for Devices and Radiological Health  
Food and Drug Administration  
9200 Corporate Blvd  
Rockville, Maryland 20850

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Please find enclosed, a Premarket Notification for LC Bead/Bead Block™ Compressible Microspheres on behalf of Biocompatibles UK Ltd.

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This letter also certifies that the E-copy of this Premarket Notification is identical to the original.

Please do not hesitate to call if you have any questions or need additional information.

Sincerely,



John Greenbaum

**FDA USER Fee Payment cover sheet**

Site: null

Page 1 of 1

Form Approved: OMB No. 0910-511 Expiration Date: January 31, 2010. See Instructions for OMB Statement.

DEPARTMENT OF HEALTH AND HUMAN SERVICES FOOD AND DRUG ADMINISTRATION <b>MEDICAL DEVICE USER FEE COVER SHEET</b>		PAYMENT IDENTIFICATION NUMBER: (b)(4) Write the Payment Identification number on your check.
A completed cover sheet must accompany each original application or supplement subject to fees. If payment is sent by U.S. mail or courier, please include a copy of this completed form with payment. Payment and mailing instructions can be found at: <a href="http://www.fda.gov/oc/mdufma/coversheet.html">http://www.fda.gov/oc/mdufma/coversheet.html</a>		
1. COMPANY NAME AND ADDRESS (include name, street address, city state, country, and post office code)  BIOCMPATIBLES UK LTD 20310 SW 48th Street Southwest Ranches FL 33332 US  1.1 EMPLOYER IDENTIFICATION NUMBER (EIN)	2. CONTACT NAME John Greenbaum  2.1 E-MAIL ADDRESS genericd@bellsouth.net  2.2 TELEPHONE NUMBER (include Area code) 954-680-2548  2.3 FACSIMILE (FAX) NUMBER (Include Area code) 954-680-0161	
3. TYPE OF PREMARKET APPLICATION (Select one of the following in each column; if you are unsure, please refer to the application descriptions at the following web site: <a href="http://www.fda.gov/oc/mdufma">http://www.fda.gov/oc/mdufma</a> )  <u>Select an application type:</u> <input checked="" type="checkbox"/> Premarket notification(510(k)); except for third party <input type="checkbox"/> 513(g) Request for Information <input type="checkbox"/> Biologics License Application (BLA) <input type="checkbox"/> Premarket Approval Application (PMA) <input type="checkbox"/> Modular PMA <input type="checkbox"/> Product Development Protocol (PDP) <input type="checkbox"/> Premarket Report (PMR) <input type="checkbox"/> Annual Fee for Periodic Reporting (APR) <input type="checkbox"/> 30-Day Notice		
3.1 Select a center <input checked="" type="checkbox"/> CDRH <input type="checkbox"/> CBER 3.2 Select one of the types below <input checked="" type="checkbox"/> Original Application <u>Supplement Types:</u> <input type="checkbox"/> Efficacy (BLA) <input type="checkbox"/> Panel Track (PMA, PMR, PDP) <input type="checkbox"/> Real-Time (PMA, PMR, PDP) <input type="checkbox"/> 180-day (PMA, PMR, PDP)		
4. ARE YOU A SMALL BUSINESS? (See the instructions for more information on determining this status) <input type="checkbox"/> YES, I meet the small business criteria and have submitted the required qualifying documents to FDA <input checked="" type="checkbox"/> NO, I am not a small business 4.1 If Yes, please enter your Small Business Decision Number:		
5. FDA WILL NOT ACCEPT YOUR SUBMISSION IF YOUR COMPANY HAS NOT PAID AN ESTABLISHMENT REGISTRATION FEE THAT IS DUE TO FDA. HAS YOUR COMPANY PAID ALL ESTABLISHMENT REGISTRATION FEES THAT ARE DUE TO FDA? <input checked="" type="checkbox"/> YES (All of our establishments have registered and paid the fee, or this is our first device, and we will register and pay the fee within 30 days of FDA's approval/clearance of this device.) <input type="checkbox"/> NO (If "NO," FDA will not accept your submission until you have paid all fees due to FDA. This submission will not be processed; see <a href="http://www.fda.gov/cdrh/mdufma">http://www.fda.gov/cdrh/mdufma</a> for additional information)		
6. IS THIS PREMARKET APPLICATION COVERED BY ANY OF THE FOLLOWING USER FEE EXCEPTIONS? IF SO, CHECK THE APPLICABLE EXCEPTION. <input type="checkbox"/> This application is the first PMA submitted by a qualified small business, including any affiliates <input type="checkbox"/> The sole purpose of the application is to support conditions of use for a pediatric population <input type="checkbox"/> This biologics application is submitted under section 351 of the Public Health Service Act for a product licensed for further manufacturing use only <input type="checkbox"/> The application is submitted by a state or federal government entity for a device that is not to be distributed commercially		
7. IS THIS A SUPPLEMENT TO A PREMARKET APPLICATION FOR WHICH FEES WERE WAIVED DUE TO SOLE USE IN A PEDIATRIC POPULATION THAT NOW PROPOSES CONDITION OF USE FOR ANY ADULT POPULATION? (If so, the application is subject to the fee that applies for an original premarket approval application (PMA).  <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
8. USER FEE PAYMENT AMOUNT SUBMITTED FOR THIS PREMARKET APPLICATION (b)(4) <span style="float: right;">22-Oct-2009</span>		

Form FDA 3601 (01/2007)

["Close Window"](#) [Print Cover sheet](#)

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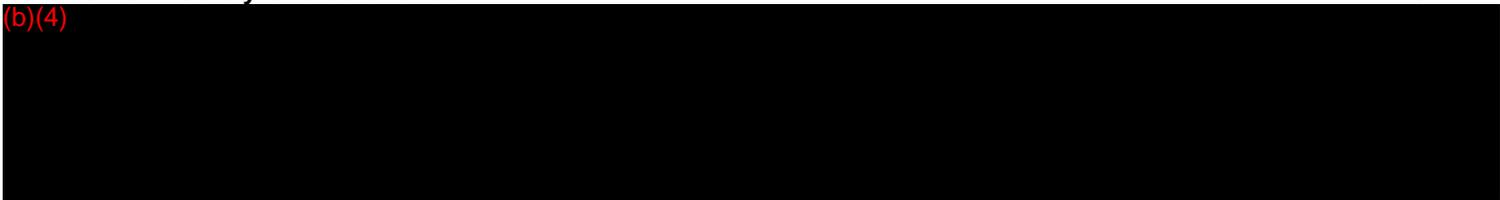
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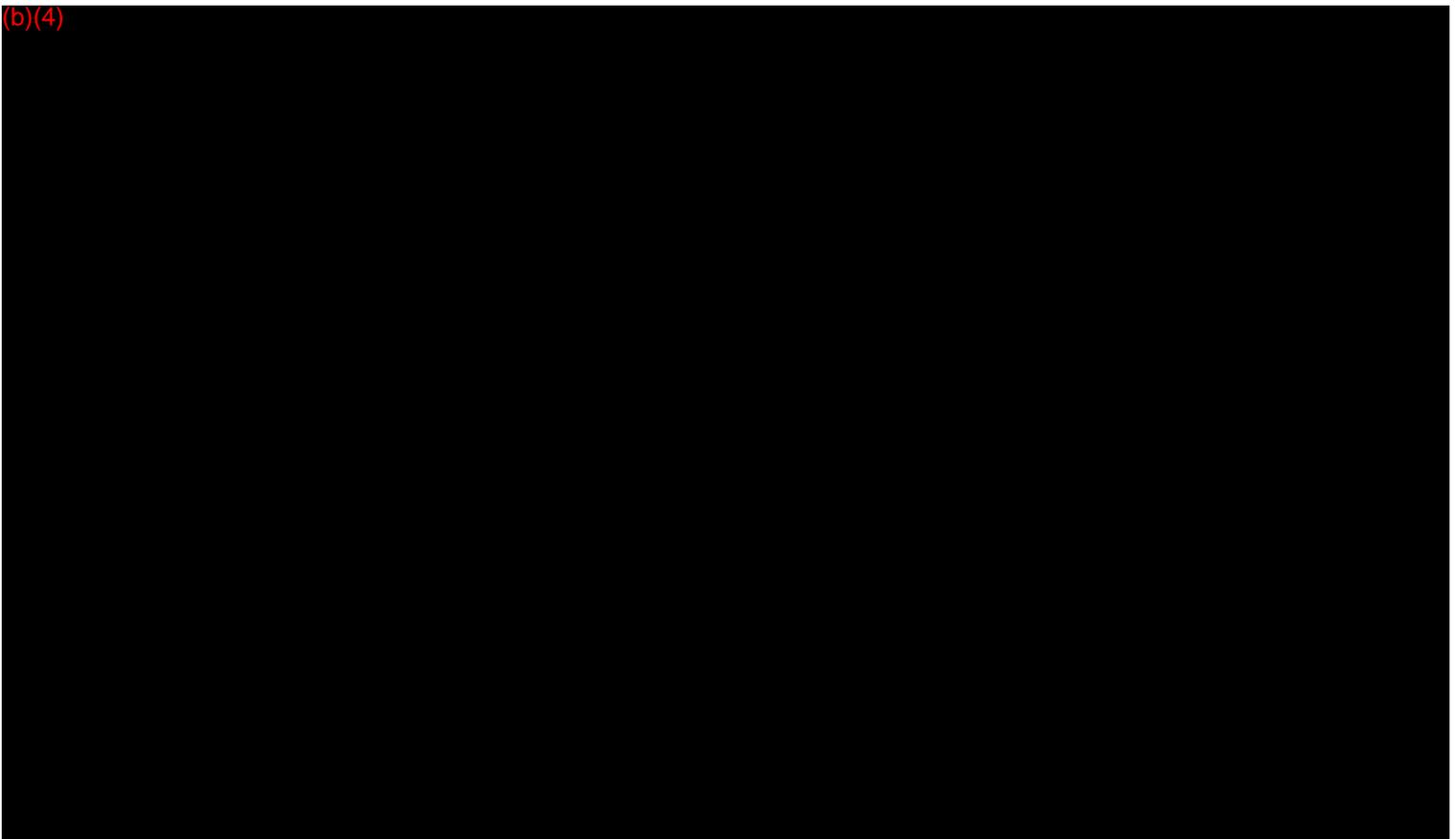
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(b)(4)

# 1 FDA Premarket Cover Sheet

CENTER FOR DEVICES AND RADIOLOGICAL HEALTH Premarket Submission Cover Sheet				
Date of Submission:		FDA Document Number:		
Section A		Type of Submission		
<b>PMA</b> <input type="checkbox"/> Original Submission <input type="checkbox"/> Modular Submission <input type="checkbox"/> Amendment <input type="checkbox"/> Report <input type="checkbox"/> Report Amendment	<b>PMA Supplement</b> <input type="checkbox"/> Regular <input type="checkbox"/> Special <input type="checkbox"/> Panel Track <input type="checkbox"/> 30-day Supplement <input type="checkbox"/> 30-day Notice <input type="checkbox"/> 135-day Supplement <input type="checkbox"/> Real-time Review <input type="checkbox"/> Amendment to PMA Supplement	<b>PDP</b> <input type="checkbox"/> Presubmission <input type="checkbox"/> Original PDP <input type="checkbox"/> Notice of intent to start clinical trials <input type="checkbox"/> Intention to submit Notice of Completion <input type="checkbox"/> Notice of Completion <input type="checkbox"/> Amendment to PDP <input type="checkbox"/> Report	<b>510(k)</b> <input type="checkbox"/> Original Submission: <input type="checkbox"/> Traditional <input checked="" type="checkbox"/> Special <input type="checkbox"/> Abbreviated <input type="checkbox"/> Additional information: <input type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	<b>Meeting</b> <input type="checkbox"/> Pre-IDE meeting <input type="checkbox"/> Pre-PMA meeting <input type="checkbox"/> Pre-PDP meeting <input type="checkbox"/> 180-day meeting <input type="checkbox"/> Other (specify):
<b>IDE</b> <input type="checkbox"/> Original Submission <input type="checkbox"/> Amendment <input type="checkbox"/> Supplement	<b>Humanitarian Device Exemption</b> <input type="checkbox"/> Original Submission <input type="checkbox"/> Amendment <input type="checkbox"/> Supplement <input type="checkbox"/> Report	<b>Class II Exemption</b> <input type="checkbox"/> Original Submission <input type="checkbox"/> Additional information	<b>Evaluation of Automatic Class III Designation</b> <input type="checkbox"/> Original Submission <input type="checkbox"/> Additional information	<b>Other Submission</b> <input type="checkbox"/> Describe Submission:
Section B		Applicant or Sponsor		
Company/Institution Name: <b>Biocompatibles UK Ltd.</b>		Establishment Registration Number: <b>3002124545</b>		
Division Name (if applicable):		Phone Number (include area code): <b>+44 (0) 1252 732732</b>		
Street Address: <b>Chapman House, Farnham Business Park , Weydon Lane</b>		FAX Number (include area code): <b>+44 (0) 1252 732888</b>		
City: <b>Farnham</b>	State/Province: <b>Surrey GU9 8QL, U.K.</b>	Country: <b>England, United Kingdom</b>		
Contact Name: <b>Dr. Alistair Taylor</b>				
Contact Title: <b>Director of Regulatory Affairs</b>		Contact e-mail address: <b>alistair.taylor@biocompatibles.com</b>		
Section C		Submission Correspondent (if different from above)		
Company/Institution Name: <b>Generic Devices Consulting, Inc.</b>		Establishment Registration Number: <b>N/A</b>		
Division Name (if applicable):		Phone Number (include area code): <b>954-680-2548 or 954-610-0178</b>		
Street Address: <b>20310 SW 48<sup>th</sup> Street</b>		FAX Number (include area code): <b>954-653-1153</b>		
City: <b>Ft. Lauderdale</b>	State/Province: <b>Florida 33332</b>	Country: <b>USA</b>		
Contact Name: <b>John Greenbaum</b>				
Contact Title: <b>President</b>		Contact e-mail address: <b>genericcd@bellsouth.net</b>		

<b>Section D1</b>			<b>Reason for Submission – PMA, PDP, or HDE</b>		
<input type="checkbox"/> New Device <input type="checkbox"/> Withdrawal <input type="checkbox"/> Additional or expanded indications <input type="checkbox"/> Licensing Agreement  <input type="checkbox"/> Process Change <input type="checkbox"/> Manufacturing <input type="checkbox"/> Sterilization <input type="checkbox"/> Packaging <input type="checkbox"/> Other (specify below)  <input type="checkbox"/> Response to FDA Correspondence: <input type="checkbox"/> Request for applicant hold <input type="checkbox"/> Request for removal of applicant hold <input type="checkbox"/> Request for extension <input type="checkbox"/> Request to remove or add manufacturing site  <input type="checkbox"/> Other reason (specify):	<input type="checkbox"/> Change in design, component, or specification: <input type="checkbox"/> Software <input type="checkbox"/> Color Additive <input type="checkbox"/> Material <input type="checkbox"/> Specification <input type="checkbox"/> Other (specify below)  <input type="checkbox"/> Labeling Change: <input type="checkbox"/> Indications <input type="checkbox"/> Instructions <input type="checkbox"/> Performance Characteristics <input type="checkbox"/> Shelf Life <input type="checkbox"/> Trade Name <input type="checkbox"/> Other (specify below)	<input type="checkbox"/> Location Change: <input type="checkbox"/> Manufacturer <input type="checkbox"/> Sterilizer <input type="checkbox"/> Packager <input type="checkbox"/> Distributor  <input type="checkbox"/> Report Submission: <input type="checkbox"/> Annual or periodic <input type="checkbox"/> Post-approval Study <input type="checkbox"/> Adverse Reaction <input type="checkbox"/> Device Defect <input type="checkbox"/> Amendment  <input type="checkbox"/> Change in ownership <input type="checkbox"/> Change in correspondent			

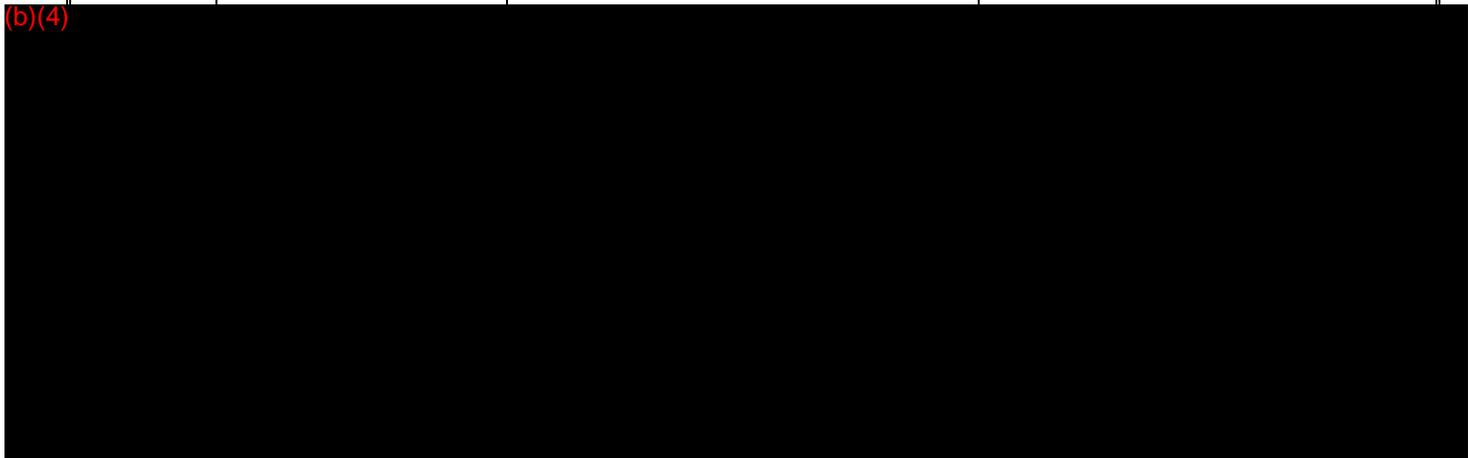
<b>Section D2</b>			<b>Reason for Submission – IDE</b>		
<input type="checkbox"/> New Device Addition of institution Expansion/extension of study IRB Certification Request hearing Request waiver Termination of Study Withdrawal of application Unanticipated adverse effect Notification of Emergency Use Compassionate use request Treatment IDE Continuing availability request  Other reason (specify):	<input type="checkbox"/> Change in: Correspondent Design Informed consent Manufacturer Manufacturing process Protocol – feasibility Protocol – Other Sponsor  <input type="checkbox"/> Report Submission: Current investigator Annual Progress Site waiver limit reached Final	<input type="checkbox"/> Response to FDA letter concerning: Conditional approval Deemed approved Deficient final report Deficient progress report Deficient investigator report Disapproval Request extension of time to respond to FDA Request meeting			

<b>Section D3</b>			<b>Reason for Submission – 510(k)</b>		
<input type="checkbox"/> New Device <input type="checkbox"/> Additional or expanded indications <input checked="" type="checkbox"/> Other (specify): <b>Additional SKU for 70 – 150 µm size range</b>	<input type="checkbox"/> Change in Technology <input type="checkbox"/> Change in Design	<input type="checkbox"/> Change in Materials <input checked="" type="checkbox"/> Change in Manufacturing process			

<b>Section E</b>												<b>Additional Information on 510(k) Submissions</b>		
Product codes of devices to which substantial equivalence is claimed:										Summary of, or statement concerning, safety and effectiveness date:				
1	<b>KRD</b>	2	<b>HCG</b>	3		4		5		6		510(k) summary attached		
7		8		9		10		11		12		510(k) statement		
Information on devices to which substantial equivalence is claimed:														
510(k) Number		Trade or proprietary or model name								Manufacturer				
1	<b>K033761</b>	1	<b>GelSpheres / Bead Block™ Compressible Microspheres</b>								1	<b>Biocompatibles UK Ltd.</b>		
2	<b>K042231</b>	2	<b>GelSpheres / Bead Block™ Compressible Microspheres</b>								2	<b>Biocompatibles UK Ltd.</b>		
3	<b>K083091</b>	3	<b>LC Bead™ / Bead Block™ Compressible Microspheres</b>								3	<b>Biocompatibles UK Ltd.</b>		
4		4									4			
5		5									5			
6		6									6			

Section F Product Information – Applicable to All Applications					
Common or usual name or classification name: <b>Artificial Embolization Device</b>					
Trade or proprietary or model name			Model Number		
1	<b>LC Bead Microspheres</b>		1	<b>Various</b>	
2	<b>Bead Block Compressible Microspheres</b>		2	<b>Various</b>	
FDA document numbers of all prior related submissions (regardless of outcome):					
1	2	3	4	5	6
<b>K023089</b>	<b>K033761</b>	<b>K042231</b>	<b>K083091</b>		
Data included in submission:		Laboratory Testing	Animal Trials	Human Trials	
Section G Product Classification – Applicable to All Applications					
Product Code: <b>KRD/HCG</b>	C.F.R. Section: <b>870.3300/882.5950</b>		Device Class: <input type="checkbox"/> Class I <input checked="" type="checkbox"/> <b>Class II</b> <input type="checkbox"/> Class III <input type="checkbox"/> Unclassified		
Classification Panel: <b>Neurological/GRND</b>					
Indications (from labeling): <b>"LC Bead Microspheres &amp; Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."</b>					
Note: Submission of this information does not affect the need to submit a 2891 or 2891a Device Establishment Registration form.			FDA Document Number:		
Section H Manufacturing / Packaging / Sterilization Sites					
<input checked="" type="checkbox"/> Original <input type="checkbox"/> Add <input type="checkbox"/> Delete	FDA establishment registration number: <b>3002124545</b>	<input checked="" type="checkbox"/> Manufacturer <input type="checkbox"/> Contract Sterilizer <input type="checkbox"/> Contract Manufacturer <input type="checkbox"/> Repackager/Relabeler			
Company / Institution Name: <b>Biocompatibles UK Ltd.</b>		Establishment Registration Number: <b>3002124545</b>			
Division Name (if applicable):		Phone Number (include area code): <b>+44 (0) 1252 732732</b>			
Street Address: <b>Chapman House, Farnham Business Park, Weydon Lane.</b>		FAX Number (include area code): <b>+44 (0) 1252 732888</b>			
City: <b>Farnham</b>	State/Province: <b>Surrey</b>	Country: <b>England</b>		Zip/Postal Code: <b>Surrey GU9 8QL</b>	
Contact Name: <b>Dr. Alistair Taylor</b>					
Contact Title: <b>Director, Regulatory Affairs</b>			Contact e-mail address: <b>alistair.taylor@biocompatibles.com</b>		
<input type="checkbox"/> Original <input checked="" type="checkbox"/> Add	FDA establishment registration number: <b>N/A</b>	<input type="checkbox"/> Manufacturer <input type="checkbox"/> Contract Manufacturer		<input checked="" type="checkbox"/> Contract Sterilizer <input type="checkbox"/> Repackager/Relabeler	

(b)(4)



## 2 General Information

### 2.1 General Information

Biocompatibles UK Ltd manufactures both the LC Bead™ Microspheres and Bead Block™ Compressible Microspheres (artificial Embolization Agent). LC Bead & Bead Block are calibrated microspheres intended for the embolization of hypervascular tumors and arteriovenous malformations (AVM). LC Bead and Bead Block can only be used by a qualified clinician (interventional radiologist) who has the appropriate training and expertise to use embolic products.

In December 2002, BioCure Inc. of Atlanta, Georgia, USA, received clearance (K023089) to market a product called “GelSpheres Embolic Agent” for the embolization of hypervascular tumors and arteriovenous malformations. This approval covered two formulations of the GelSpheres which BioCure termed 7-1 and 7-11.

In September 2003, Biocompatibles UK Ltd acquired from BioCure, Inc., the rights to market, distribute and manufacture both the 7-1 and 7-11 formulations of the GelSpheres Embolic Agent. At this point Biocompatibles UK Ltd renamed the 7-1 formulation as Bead Block and started to market the product as a repackager of the BioCure product in both the US and EU. The 7-11 formulation was not renamed and remained as GelSpheres at this time.

Biocompatibles UK Ltd was approved as manufacturer of both formulations in 2004 in the US and EU. Both Bead Block and GelSpheres remained as the formulation names.

In 2005 in the US, the 7-11 GelSpheres product was renamed as LC Bead prior to commercialization. (b)(4)

The 7-1 product formulated by BioCure remains identical to the original submissions. This model is referred to as Bead Block.

The 7-11 product formulated by BioCure remains identical to the original submissions. This model is referred to as LC Bead.

It is the intention of Biocompatibles UK Ltd in this Premarket Notification, to market the LC Bead and Bead Block manufactured at the facilities of Biocompatibles UK Ltd with one additional Stock Keeping Unit (SKU), for the LC Bead formulation in the size range of 70–150µm.

Note: the Standards data reports (Form 3654) for each Standard referenced in this submission are included in Appendix I.

## **2.2 Legally Marketed Device**

### **a. Trade / Proprietary Name:**

LC Bead Microspheres

Bead Block Compressible Microspheres

### **b. Classification Name / code Common Name:**

a) Vascular Embolization Device Code: KRD Device, arterial embolization

b) Neurovascular Embolization Device HCG Device, arterial embolization

### **c. Establishment Registration:**

3002124545

### **d. Manufacturing Facility:**

Biocompatibles UK Ltd.

Chapman House

Farnham Business Park

Weydon Lane

Farnham, Surrey,

England GU9 8QL

### **e. Classification:**

Class II

**f. Reason for 510(k):**

Adding of one SKU to the LC Bead formulation in the size range of 70-150µm.

Modifications to manufacturing process for this SKU only.

**g. Equivalent Devices:**

LC Bead and Bead Block is substantially equivalent to:

- LC Bead Microspheres & Bead Block Compressible Microspheres
  - Biocompatibles UK Ltd (K033761)
- Bead Block Compressible Microspheres & LC Bead Microspheres
  - Biocompatibles UK Ltd (K042231)
- Bead Block Compressible Microspheres & LC Bead Microspheres
  - Biocompatibles UK Ltd (K083091)

**h. Standards / Special Controls:**

Artificial embolization devices have special controls as published by FDA in 2004 Class II Special Controls Guidance Document: Vascular and Neurovascular Embolization Devices. Documentation of compliance with all respective standards was provided in (K042231, and K083091). LC Bead and Bead Block meets the requirements of this Guidance. LC Bead conforms to the following recognized standards.

- 21CFR820 1996: Quality System Regulation
- Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products
- ISO/EN 10993-1 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing
- ISO/EN 10993-3 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.
- ISO/EN 10993-4 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.

- ISO/EN 10993-5 2009, Biological evaluation of medical devices Part 5: Tests for In Vitro cytotoxicity.
- ISO/EN 10993-6 2009 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.
- ISO/EN 10993-10 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.
- ISO/EN 10993-11 2009 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.
- ISO/EN 11607; 1997 – Packaging for terminally sterilized products.
- AAMI 17665-1 2006 – Sterilization of Health Care Products – Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ANSI/AAMI/ISO 14937 2000 Sterilization of Healthcare Products – Moist Heat-Part 1: Requirement for the Development, Validation and routine control of a sterilization process for medical devices
- ISO14971 2007 Medical Devices – Application of risk management to medical devices.

## Required Statements

## CERTIFICATION STATEMENT

### PREMARKET NOTIFICATION:

### CONFORMITY TO APPLICABLE STANDARDS

I certify that in my capacity as Director of Regulatory Affairs at Biocompatibles UK Ltd I believe to the best of my knowledge, that the LC Bead™ Microspheres and Bead Block™ Compressible Microspheres (Artificial Embolization Agent) conforms to the requirements of the following standards as applicable:

- Tripartite Guidance – 1987 (G87-1)
- FDA Guidance on Validation of LAL as End Product Endotoxin Test for Human and Animal Parenteral Drugs and Medical Devices (1997)
- FDA Guidance for Neurological Embolization Devices (2004)
- FDA ORDB 510K Sterility Review Guidance (07/1997)
- ISO 10993 Parts 1-13 as applicable
- ANSI/AAMI 14937 – Sterilization of Health Care products (2000)
- AAMI 17665-1 2006 – Sterilization of Health Care Products – Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ISO/EN 11607 1997– Packaging for terminally sterilized devices
- ISO 14971 - Medical devices – Risk management – Part 1: Application of Risk Analysis



Alistair Taylor, Director of Regulatory Affairs, Biocompatibles UK Ltd

18 December 2009.

Date

### LC Bead /Bead Block Compressible Microspheres

510(k) Premarket Notification Title

510(k) Premarket Notification Number

510(k) Number(if known): \_\_\_\_\_

Device Name:

**LC Bead Microspheres  
Bead Block Compressible Microspheres**

Indications For Use:

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

---

Prescription Use  X  OR Over-The-Counter Use       
(Per 21 CFR 801.109)

PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

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Concurrence of CDRH, Office of Device Evaluation (ODE)

(Optional Format 1-2-96)

**CERTIFICATION STATEMENT  
PREMARKET NOTIFICATION  
TRUTHFUL AND ACCURATE STATEMENT**  
(As Required by 21 CFR 807.87(j))

I certify, that in my capacity as Director of Regulatory Affairs at Biocompatibles UK Ltd, that I believe to the best of my knowledge, that all data and information submitted on this Premarket Notification are truthful and accurate and that no material fact has been omitted.

*Alistair Taylor*

Alistair Taylor, Director of Regulatory Affairs, Biocompatibles UK Ltd.

*18 December 2009*

Date

LC Bead/Bead Block Compressible Microspheres  
510(k) Premarket Notification Title

\_\_\_\_\_  
510(k) Premarket Notification Number



### 3 510K Summary

**Submitter:**

Biocompatibles UK Ltd.  
Weydon Lane  
Chapman House  
Weydon Lane, Farnham, Surrey  
+44 1252732732

**Contact:**

Dr. Alistair Taylor

#### **510(k) Numbers and Product Codes of equivalent devices.**

Biocompatibles UK Ltd  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number: K033761  
Product Code: HCG/KRD  
**CFR Section: 882.5950**

Biocompatibles UK Ltd.  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number(s): K042231/K083091  
Product Code: HCG/KRD  
**CFR Section: 870.3300/882.5950**

#### **3.1 Indications for Use and Intended Population**

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

**3.1.1 Device Description**

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consist of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range.

LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

Product	Volume of beads (mL)	Volume PBS (mL)	Total volume (mL)
LC Bead Microspheres	1	7	8
	2	6	8
Bead Block Compressible Microspheres	1	5	6
	2	4	6

**Table 3.1** LC Bead/Bead Block product configurations.

**3.2 Similarities and Differences to Predicates**

The intended use of LC Bead/Bead Block and the predicate device are the same and unchanged. Biocompatibles UK Ltd intend to market LC Bead with an additional SKU in the size range of 70-150µm. (b)(4)

(b)(4) Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

### 3.3 Performance Standards

LC Bead/Bead Block Compressible Microspheres meet the following Performance Standards:

- Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products.
- ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing.
- ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.
- ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.
- ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.
- ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.
- ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.
- ISO/EN 11607; 1997 – Packaging for terminally sterilized products.
- AAMI 17665-1; 2006 – Sterilization of Health Care Products Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ANSI/AAMI/ISO 14937; 2009 – Sterilization of Health Care Products Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.
- ISO 14971; 2007 – Medical Devices – Application of Risk Management

### 3.4 Conclusion

There are more similarities than differences between the predicate device and the LC Bead/Bead Block products. This Premarket Notification explains the minor revisions made to the manufacturing process to enable production of the additional smaller diameter SKU. The primary packaging, indications for use, specifications and chemistry are unchanged from K033761/K042231/K083091. The predicate device and LC Bead/Bead Block products have the same intended use, warnings and contraindications.

The predicate device and LC Bead/Bead Block products are identical other than the added size range, in design, and unchanged from the predicate device. When used in accordance with the instructions for use, by qualified personnel, the LC Bead/Bead Block products are safe and effective, as indicated, for the intended use.

## 4 Device Description

### 4.1 General Device Description

LC Bead and Bead Block are preformed soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to target tissue, such as a fibroid or a cancerous tumor. LC Bead and Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Bloc is dyed blue to aid in the visualization of the microspheres in the delivery syringe. LC Bead are available either undyed in a natural color or dyed blue. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range.

The product will be supplied sterile and packaged in sealed glass bottles (LC Bead) or prefilled syringes (Bead Block).

Two quantities will be available in vials:

- 1mL LC Beads in sterile phosphate buffered saline (PBS) to a volume of 8mL.
- 2mL LC Beads in sterile PBS to a volume of 8mL.

Two quantities will be available in pre-filled syringes:

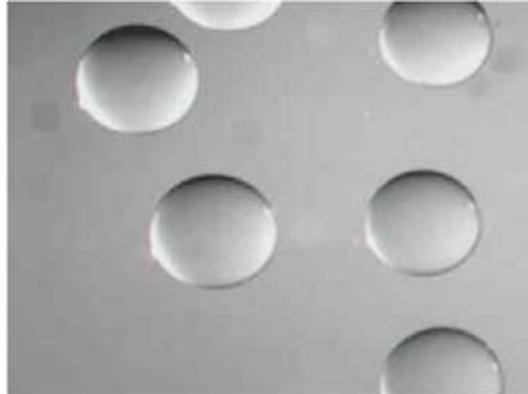
- 1mL Bead Block in syringes in sterile PBS to a volume of 6mL.
- 2mL Bead Block in syringes in sterile PBS to a volume of 6mL.

The shelf life of LC Bead Microspheres and Bead Block Compressible Microspheres is a minimum of 4 years.

Undyed LC Bead model numbers beginning with the letters UB are provided in vials and contain (b)(4) comonomer. Blue dyed LC Bead beginning with the letters VE are provided in vials and contain (b)(4) comonomer. Bead Block model numbers beginning with the letters EB are provided in a prefilled syringe and contain (b)(4) and are dyed blue. There are no other differences between the LC Bead Microspheres

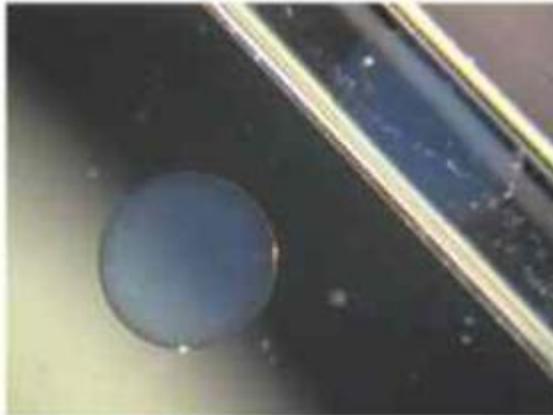
and Bead Block Compressible Microspheres. Detailed discussion of LC Bead Microspheres and Bead Block Compressible Microspheres chemistry is provided later in this section.

LC Bead/Bead Block Microspheres is approved in several units covering the range from 100-1200 $\mu$ m diameter (100-300, 300-500, 500-700, 700-900, 900-1200 $\mu$ m).



**Figure 4-1** LC Bead/Bead Block Embolic Agent (ca. 500 $\mu$ m diameter)

At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™ to make a 30-50% by weight solution (figure 4-2).



**Figure 4-2** LC Bead/Bead Block geometry and appearance in the catheter lumen

The vial containing LC Bead is, packaged in a cardboard box. The LC Bead are contained in a sealed glass vial. The vial contains the LC Bead in a solution of (b)(4) PBS. The vial contents are sealed using a rubber stopper with metal retaining ring, and is provided 'STERILE' (vial contents are sterile) by moist heat sterilization. LC Bead are

labeled as “NON PYROGENIC”. The LC Bead Microspheres is for single use only.

Prefilled syringes with Bead Block are packaged in a polycarbonate tray with a Tyvek™ lid. The syringe is made of polycarbonate and contains a silicone rubber bung.

Bead Block is available in the configurations shown in table 4.1. LC Beads (undyed) are available in the configurations shown in table 4.2. LC Beads (dyed) are available in the configurations shown in table 4.3. Images of the LC Bead and Bead Block products are shown in figures 4.3 and 4.4 respectively.

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
EB1S103	100-300	1	5
EB1S305	300-500	1	5
EB1S507	500-700	1	5
EB1S709	700-900	1	5
EB1S912	900-1200	1	5
EB2S103	100-300	2	4
EB2S305	300-500	2	4
EB2S507	500-700	2	4
EB2S709	700-900	2	4
EB2S912	900-1200	2	4

**Table 4.1** Bead Block available size ranges

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
UB1V103	100-300	1	7
UB1V305	300-500	1	7
UB1V507	500-700	1	7
UB1V709	700-900	1	7
UB1V912	900-1200	1	7
UB2V103	100-300	2	6
UB2V305	300-500	2	6
UB2V507	500-700	2	6
UB2V709	700-900	2	6
UB2V912	900-1200	2	6

**Table 4.2** LC Bead (undyed) available size ranges

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
VE110GS	70-150	1	7
VE210GS	100-300	1	7
VE410GS	300-500	1	7

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
VE110GS	70-150	1	7
VE610GS	500-700	1	7
VE810GS	700-900	1	7
VE1010GS	900-1200	1	7
VE120GS	70-150	2	6
VE220GS	100-300	2	6
VE420GS	300-500	2	6
VE620GS	500-700	2	6
VE820GS	700-900	2	6
VE1020GS	900-1200	2	6

**Table 4.3** LC Bead (RB4 dyed) available size ranges



**Figure 4-3** LC Bead in Vial



**Figure 4-4** Bead Block in Syringe

## 4.2 Indication for Use and Intended Population

### 4.2.1 Indication for use Statement

Although Biocompatibles UK Ltd believes that LC Bead/Bead Block may have several

clinical uses, the indication for use is the following:

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

The Indications For Use Statement in the prescribed format is provided in Appendix IV.

#### **4.2.2 Intended Use Population**

Hypervascular tumors are the most widely embolized vascular tissue. According to literature searches conducted in two prominent peer review journals, *Radiology* and *Journal of Vascular and Interventional Radiology* on publications during the past ten years, hypervascular tumors represent a broad range of tissue as shown below:

**(Note:** Biocompatibles UK Ltd does not plan to use the specific list below for the product labeling or for the Indications for Use. This information is provided to present to the reviewer examples of hypervascular tumors)

- Liver cancer (hepatocellular carcinoma).
- Kidney cancer (renal cell carcinoma).
- Pancreatic cancer.
- Bladder cancer.
- Splenic cancer.
- Spinal tumors.
- Biliary cancer.
- Peripheral and Neurovascular AVM's.

**The company intends to make no references to uterine fibroid embolization under this Premarket Notification.**

The common feature of these hypervascular tumors is that their blood supply usually originates from small arteries that can be accessed via selective catheterization. The

arteries leading to these hypervascular tumors range from mid size arteries (1708 $\mu$ m) to very small arterioles (100 $\mu$ m). The general procedure involves accessing the tumor site by a feeder artery with a catheter of appropriate size followed by injection of the embolic agent into the arterial stream. In all cases, the embolic effect involves the blockage of these small arteries with particulate or liquid embolic agents. To date, hypervascular tumors have been embolized by several embolic agents, including polyvinyl alcohol (PVA) particles (e.g. Contour PVA), gelatin sponges, ethanol, compressible microspheres (Embosphere<sup>®</sup> microspheres), n-butyl cyanoacrylate (TruFill<sup>®</sup> nBCA), and ethylene vinyl acetate in DMSO (Onyx<sup>™</sup>). Although these agents block blood supply to the hypervascular tumors resulting in ischemia, some clinicians also use adjunctive agents with the embolic agents, including ethiodized oils, particularly for hepatocellular carcinoma. The embolization of these hypervascular tumors can also take place prior to surgical removal of the cancerous tissue, such as in the presurgical devascularization of a liver or kidney tumors.

Arteriovenous malformations (AVM) are abnormal blood vessels which may exist in the brain and other anatomical locations. AVM's develop when there are abnormal communications that directly connect relatively large arteries to veins. The blood is exchanged at a relatively higher pressure with greater blood flow to the vein. The anatomy of the vein is not designed to take arterial pressure and/or flow rate. In the presence of an AVM the vein expands and pushes against the normal brain tissue. This may have a variety of neurological effects. Often there is a rupture in the supplying arteries, the AVM itself, or the enlarged veins which results in an intracranial hemorrhage. AVM's in other parts of the anatomy will have a similar effects and complications. AVM's have been embolized using several embolic agents, including polyvinyl alcohol (PVA) particles (e.g. Contour PVA), gelatin sponges, ethanol, compressible microspheres (Embosphere<sup>®</sup> microspheres), n-butyl cyanoacrylate (TruFill<sup>®</sup> nBCA) ethylene vinyl acetate in DMSO (Onyx<sup>™</sup>)

### 4.2.3 Contraindications

The Contraindications listed below are included in the LC Bead and Bead Block Instructions for Use (Appendix IV).

- Patients intolerant to occlusion procedures.
- Vascular anatomy or blood that precludes catheter placement or emboli injection.

- Presence or likely onset of vasospasm.
- Presence or likely onset of hemorrhage.
- Presence of severe atheromatous disease.
- Presence of feeding arteries smaller than distal branches from which they emerge.
- Presence of patent intracranial anastomoses or shunts.
- Presence of collateral vessel pathways potentially endangering normal territories during embolization.
- Presence of end arteries leading directly to cranial nerves.
- Presence of arteries supplying the lesion not large enough to accept LC Bead/Bead Block
- Vascular resistance peripheral to the feeding arteries precluding passage of LC Bead/Bead Block into the lesion.
- Do not use LC Bead/Bead Block in the following applications:
  - Embolization of large diameter arteriovenous shunts (i.e. where the blood does not pass through the arterial / capillary / venous transition but directly from artery to vein).
  - The pulmonary arterial vasculature.
  - Use in any vasculature where the use of LC Bead/Bead Block could pass directly into the internal carotid artery or other non target territories.

#### **4.2.4 Warnings**

The warning statement below is included in the LC Bead/Bead Block Instructions for Use (Appendix IV).

**WARNING:** Studies have shown that LC Bead do not form aggregates and, as a result, penetrate deeper into the vasculature as compared to similarly sized PVA particles. Care must be taken to choose a larger sized LC Bead Embolic Agent when embolizing arteriovenous malformations with large shunts to avoid passage of the microspheres into the pulmonary or coronary circulation.

The color of the LC Bead could be visible through the skin if injected into arteries feeding superficial tissues.

### 4.3 Device Operation

The method of application of LC Bead/Bead Block and the predicate device is the same. All devices are intended to be delivered to selected sites through catheters with a diameter appropriate for the vascular target and the size of the microspheres being used. Accurate placement of all of the embolization devices is assured through visualization of the embolization process using radiographic imaging. All of the devices are mixed with a radioopacity agent prior to injection to permit visualization. LC Bead/Bead Block products like the predicate device are available in a range of sizes to permit selection of the most appropriate size for the target vessels.

### 4.4 Device Manufacturing

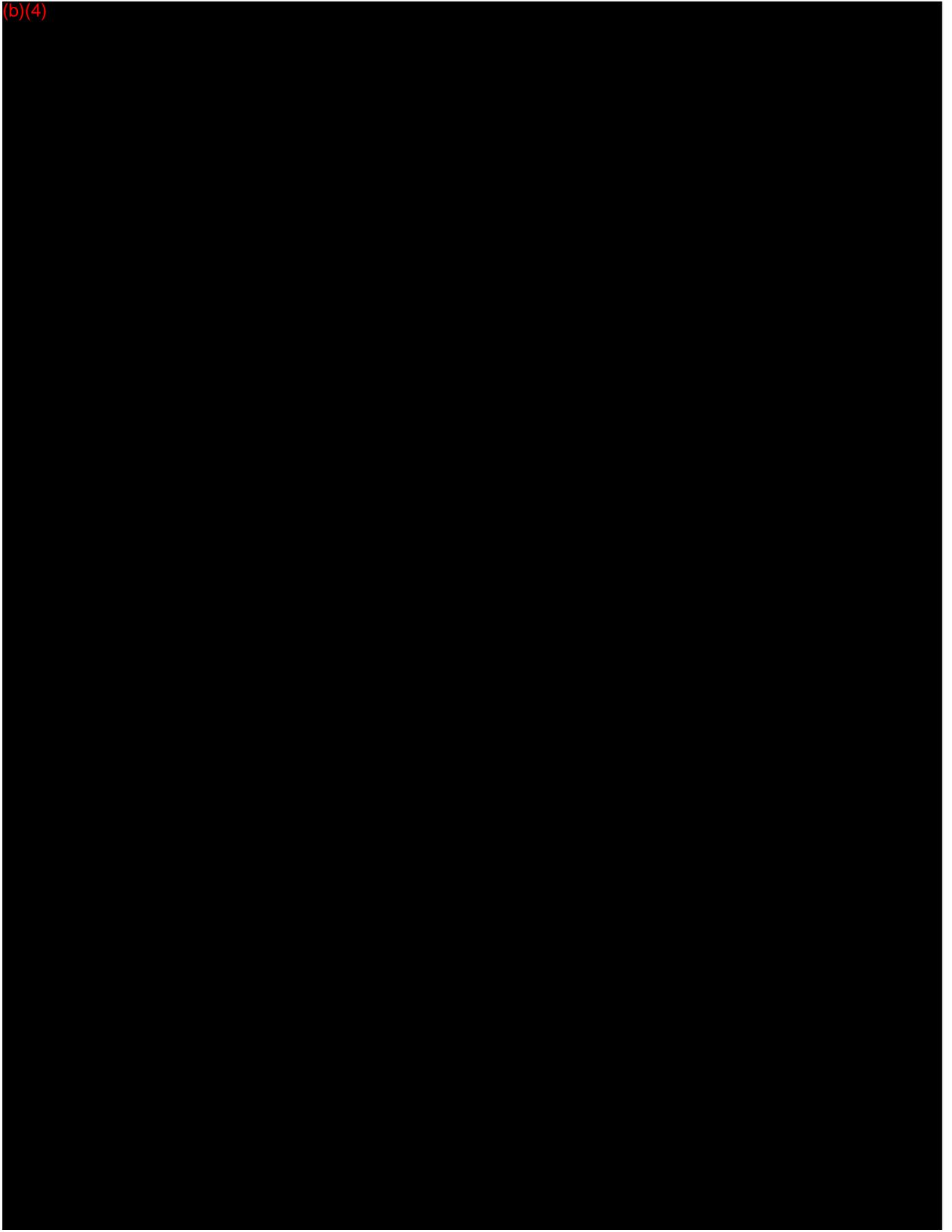
The manufacturing process used by Biocompatibles UK Ltd is identical to the processes used in K083091. The text below describes the manufacture of all sizes of LC Bead/Bead Block. (b)(4)

(b)(4)

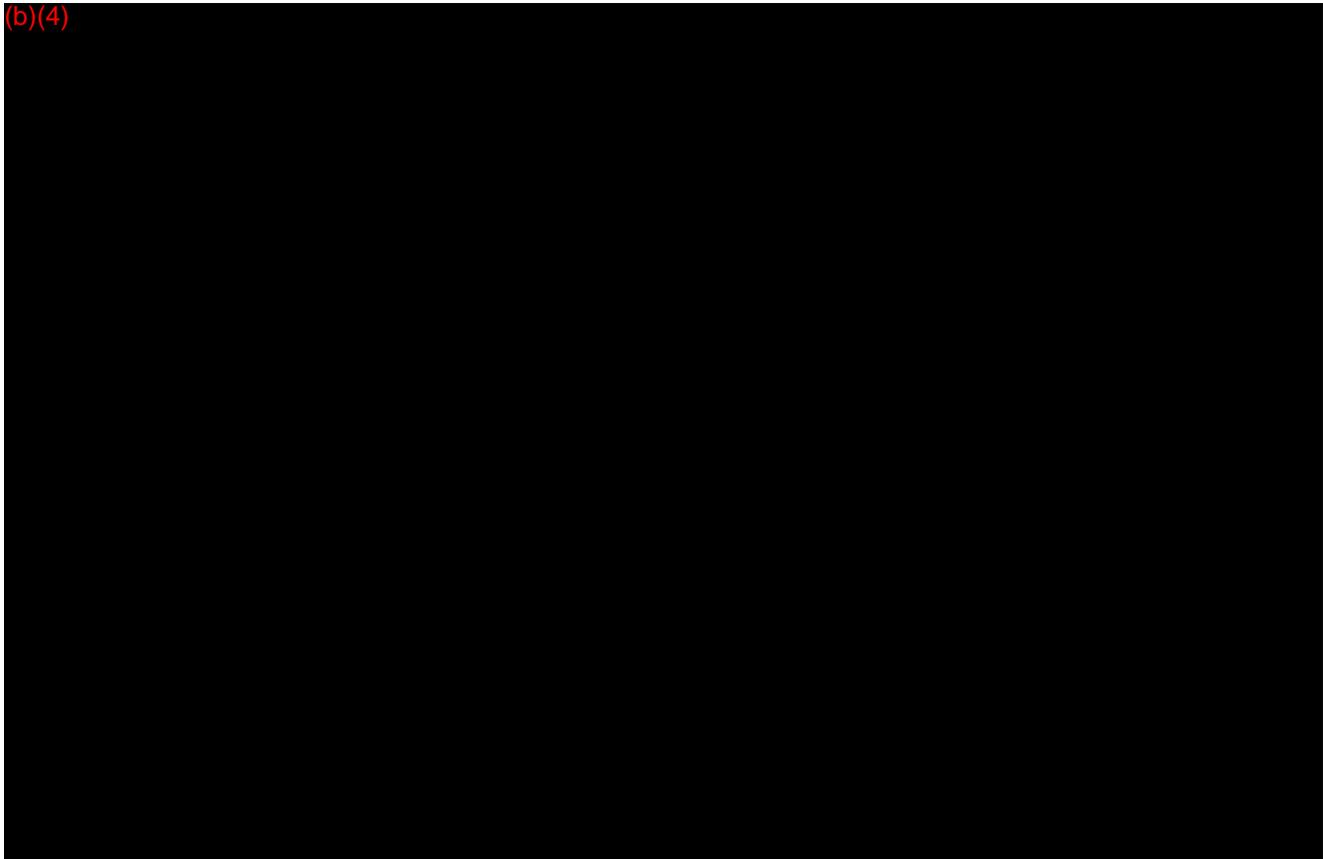
#### 4.4.1 Manufacturing process

(b)(4)

(b)(4)



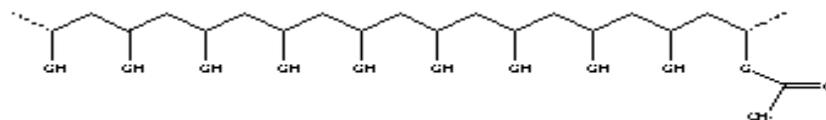
(b)(4)



An outline of the synthetic pathway of LC Bead/Bead Block is provided in K023089 along with a tabulated summary of the individual materials used in production and their role in the synthetic process. The general chemical characteristics of each material are presented below. All chemicals are used as received after incoming inspection.

**4.4.1.1 (b)(4) macromer synthesis (step 1)**

Polyvinyl alcohol (PVA) (figure 4-6) is a widely used industrial and medical polymer. The applications of PVA are as diverse as clothing fibers, thickening agents, emulsion stabilizers and wet adhesives to embolic agents and contact lenses.

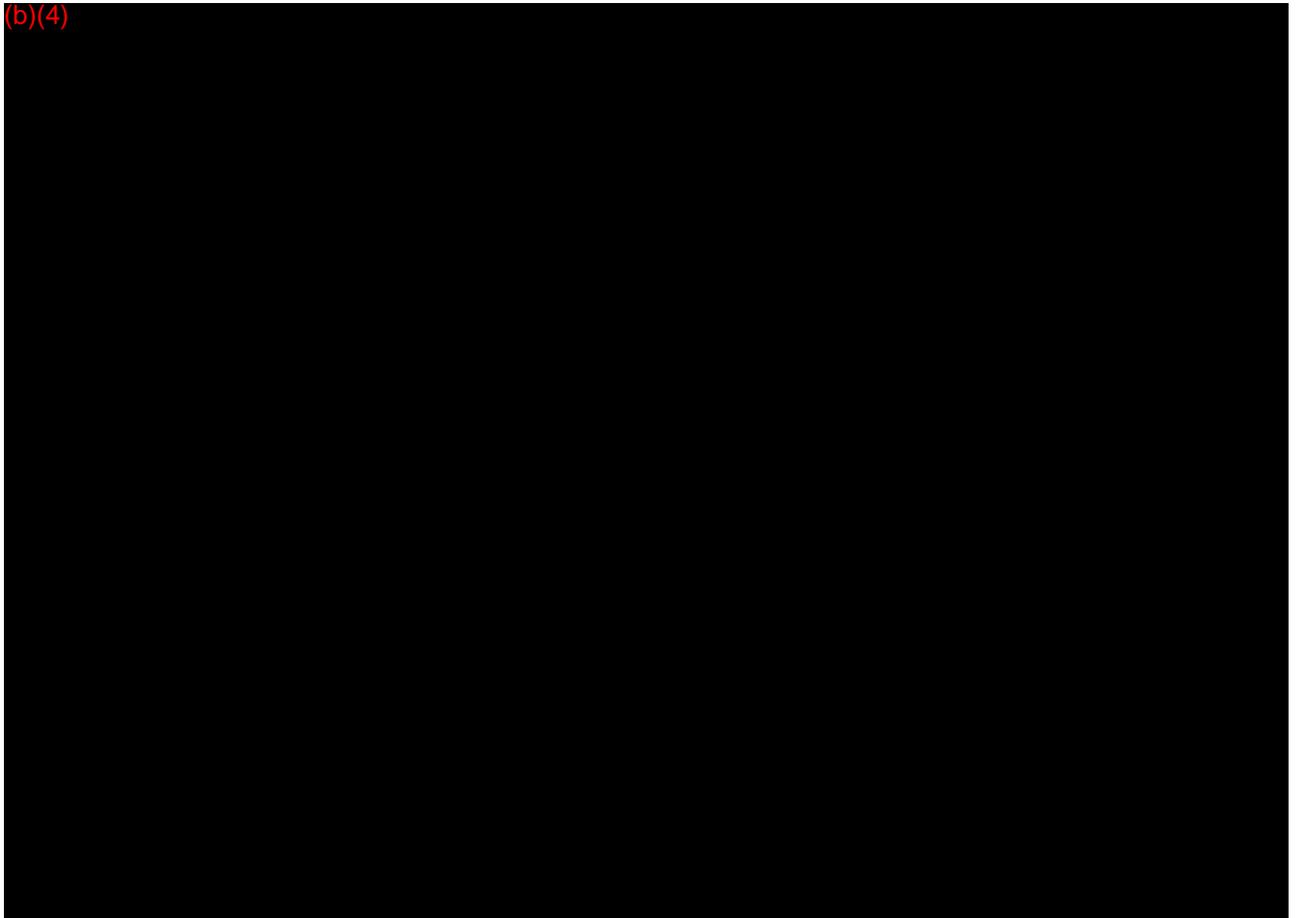


**Figure 4-6** Chemical structure of PVA

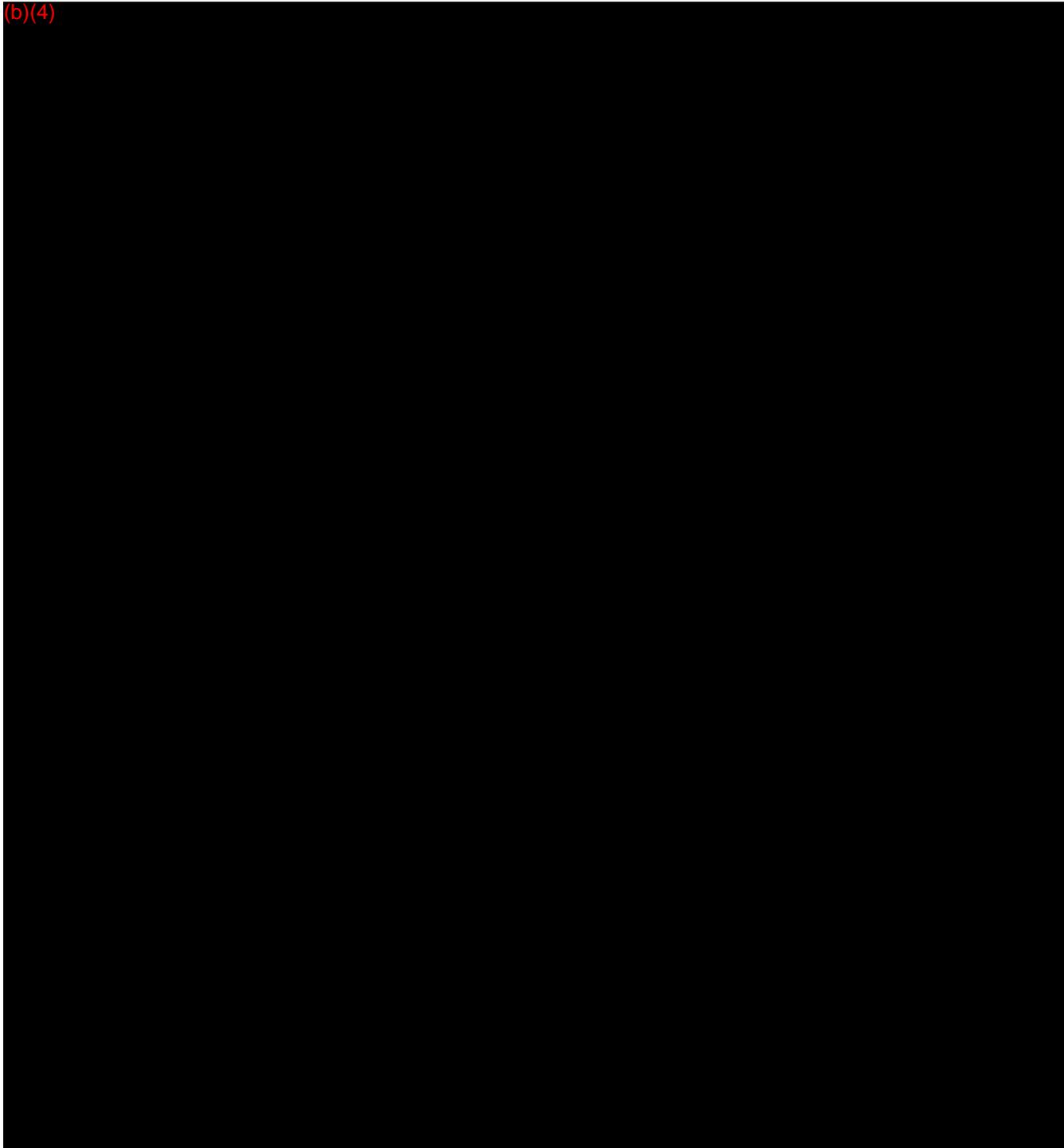
PVA is a water soluble polymer made from the polymerization of vinyl acetate monomers. Polyvinyl acetate is very hydrophobic and therefore not water soluble. Alcoholysis or saponification of the polyvinyl acetate in ethanol or methanol with an alkaline or acidic catalyst causes cleavage of the pendant acetate groups to form pendant hydroxyl groups resulting in the formation of PVA (*ref. Billmyer, p.391-5*). Some acetate groups remain on the PVA chain. PVA can be purchased in a wide variety of molecular weights and acetate content.

This water solubility and the presence of pendant hydroxyl groups offers the flexibility for a wide range of modifications, for example hydrophobic modification with butyraldehyde for the production of safety glass (*ref. Billmyer, p.391-5*) or the addition of monomers to form water soluble polymerisable PVA macromers for manufacturing hydrogel contact lenses (Muller B. Crosslinked Polymers, US 5,932,674. 1999). Embolic agents have also been prepared with PVA by crosslinking the pendant hydroxyl groups with gluteraldehyde to form tough, water insoluble particles (*Billmeyer, F.W. Jr; 'Textbook of Polymer Science, John Wiley & Son, Inc. Singapore, 1984*)

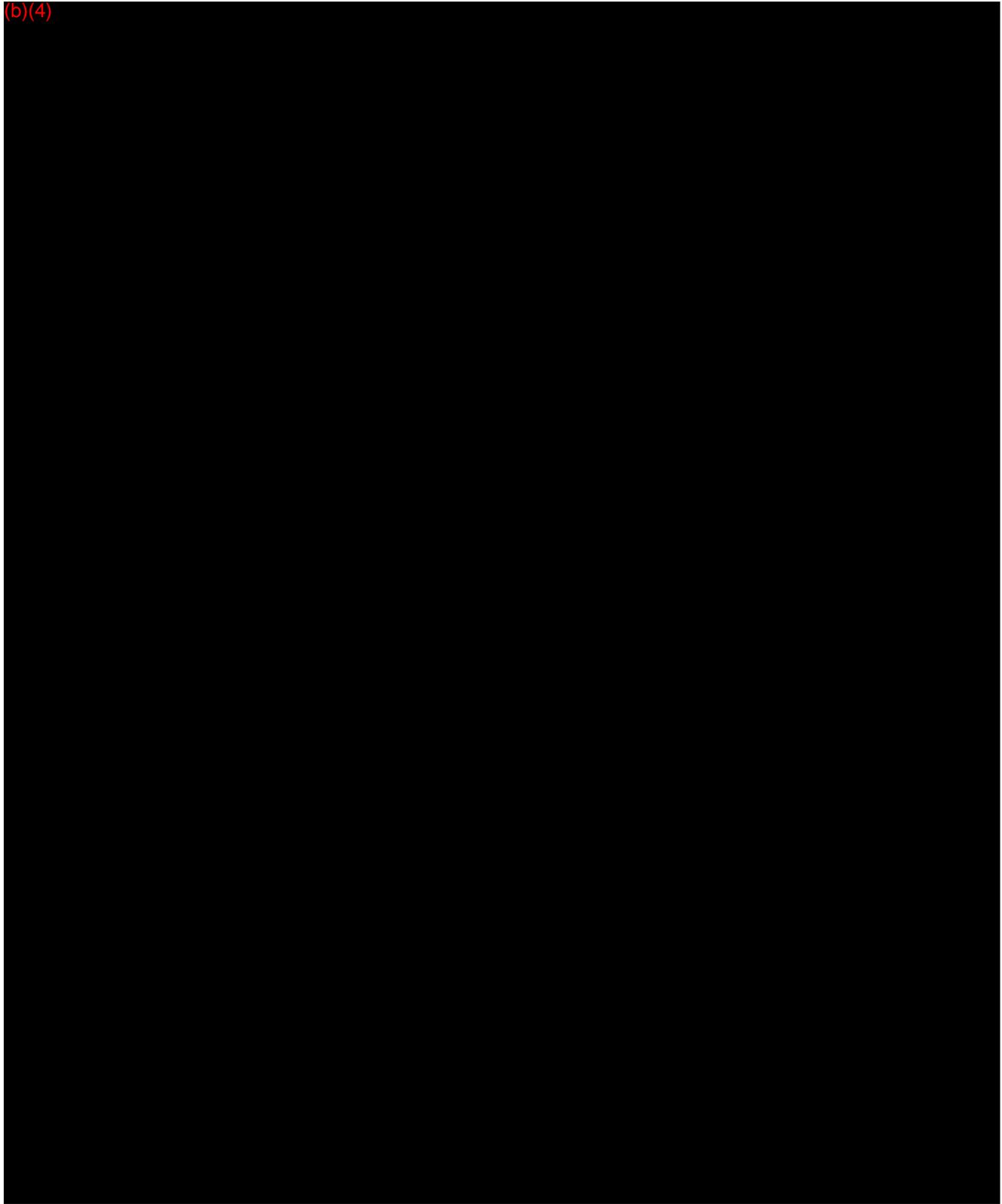
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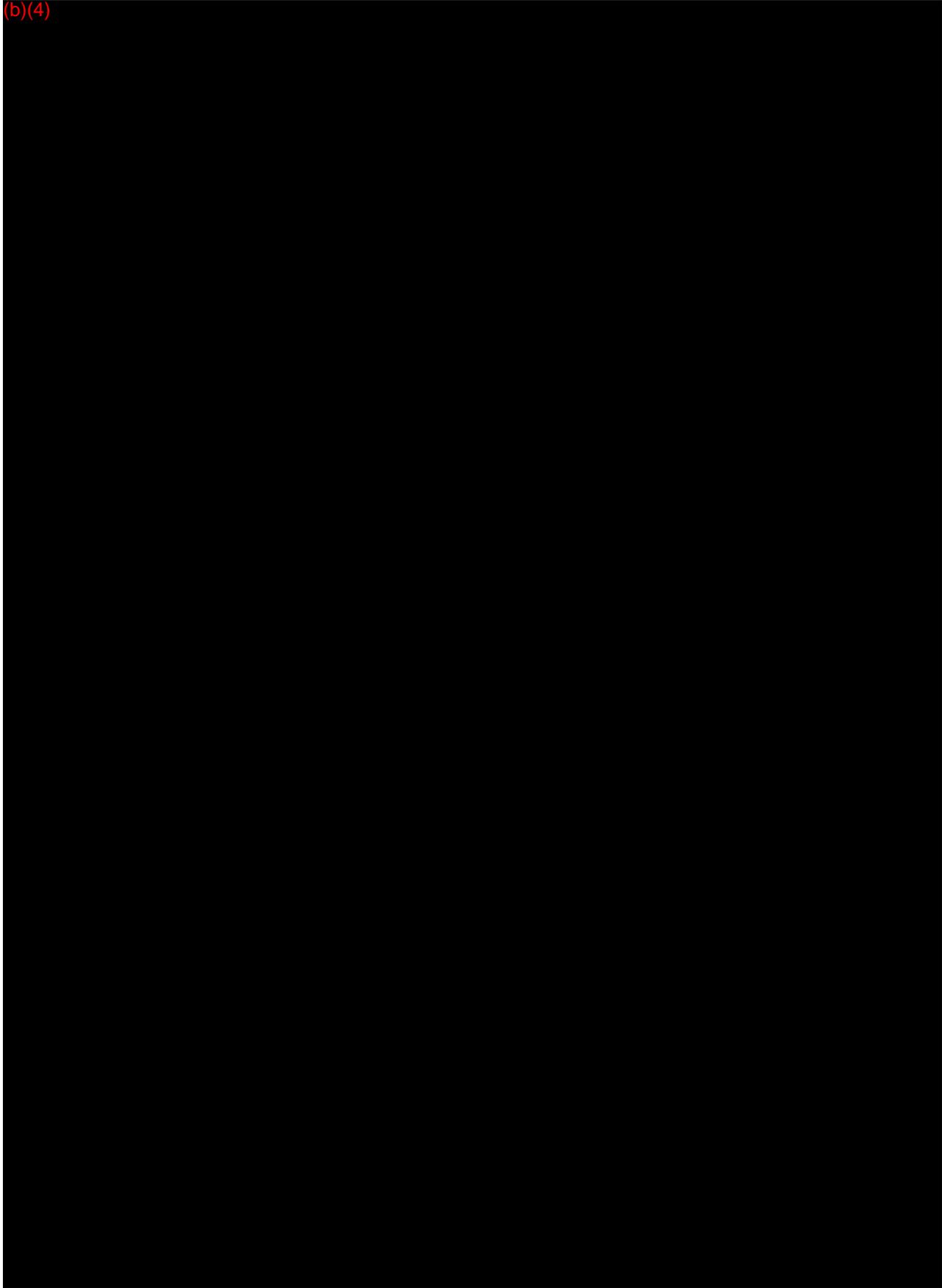
(b)(4)



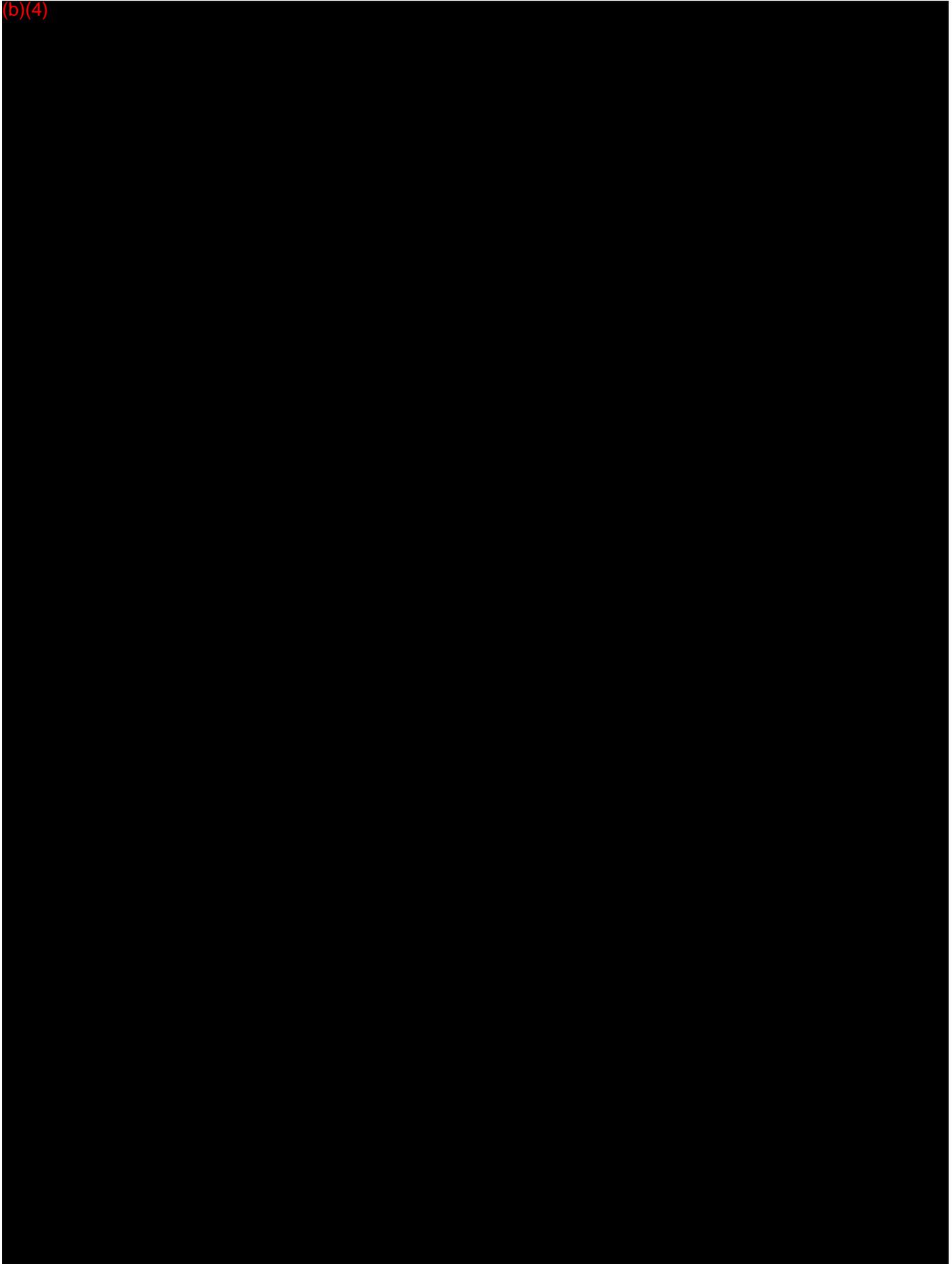
(b)(4)



(b)(4)



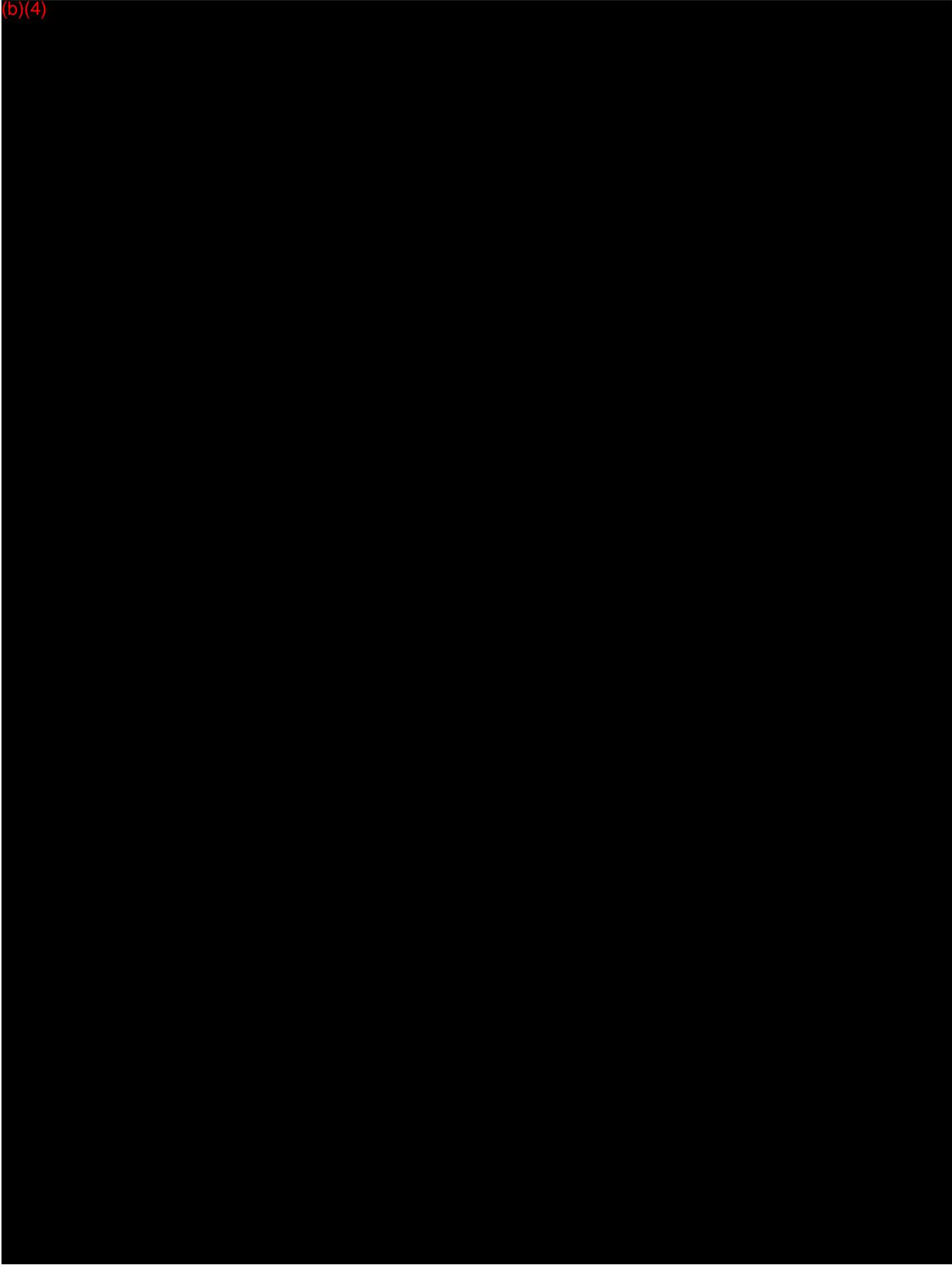
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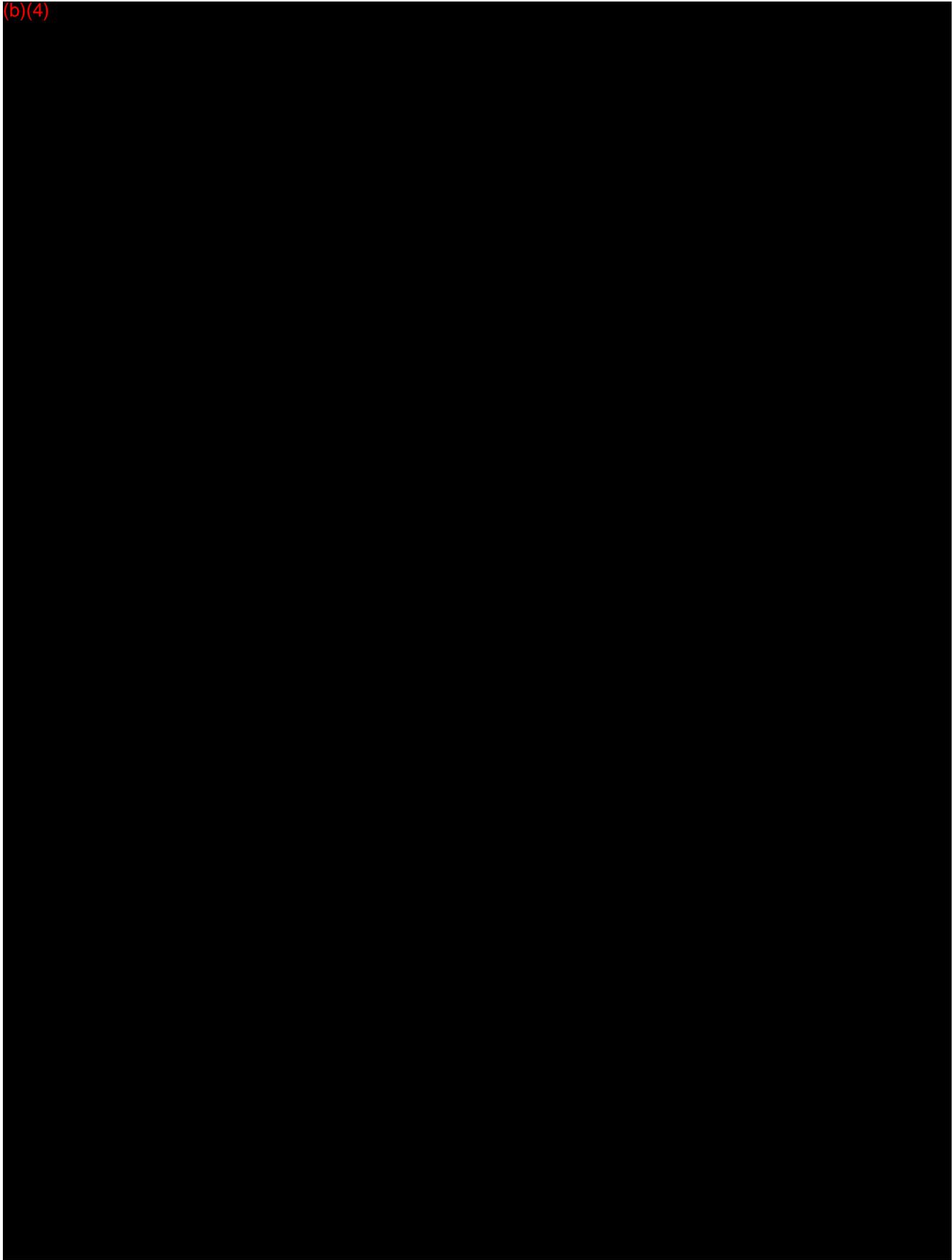
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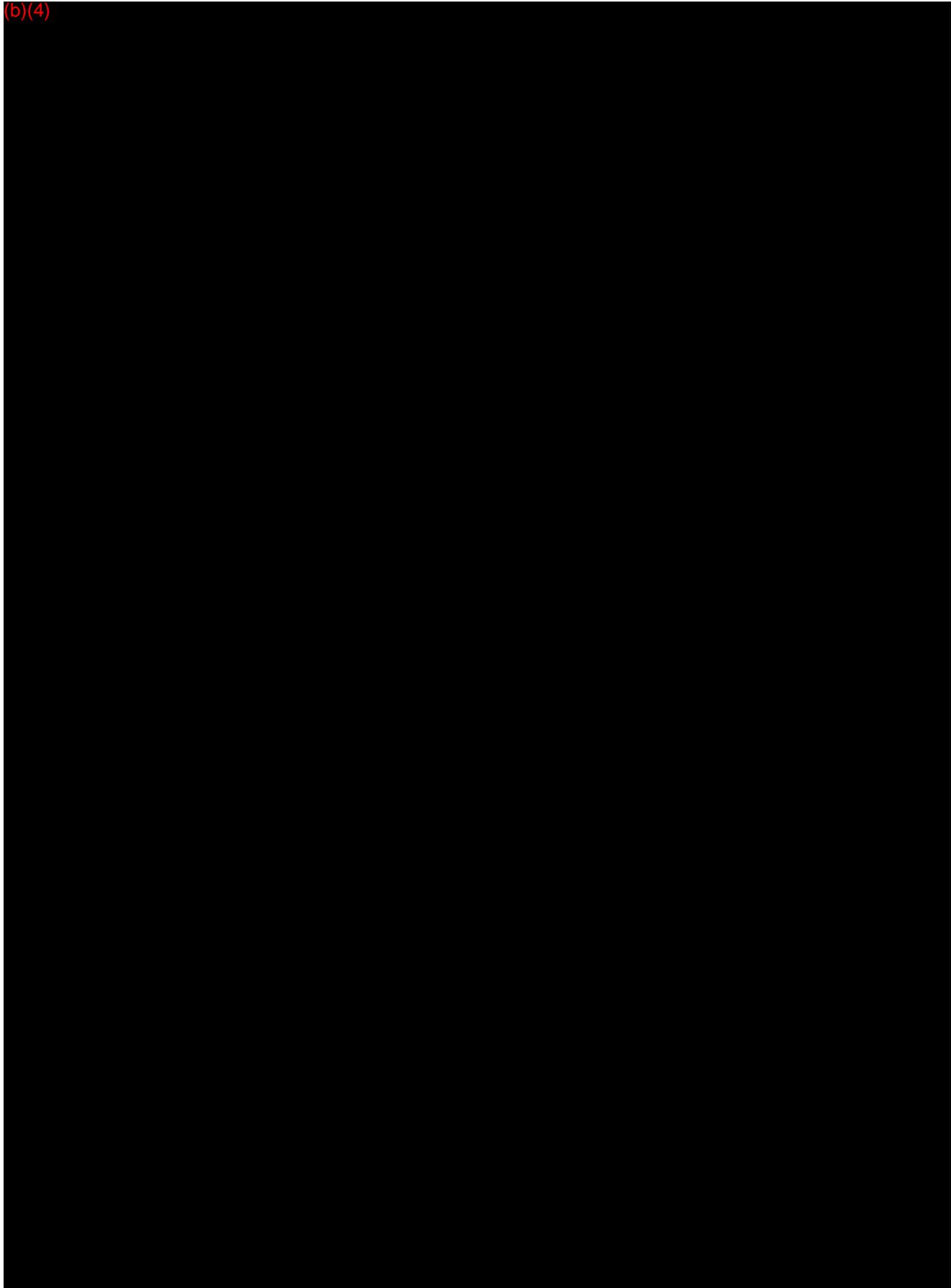
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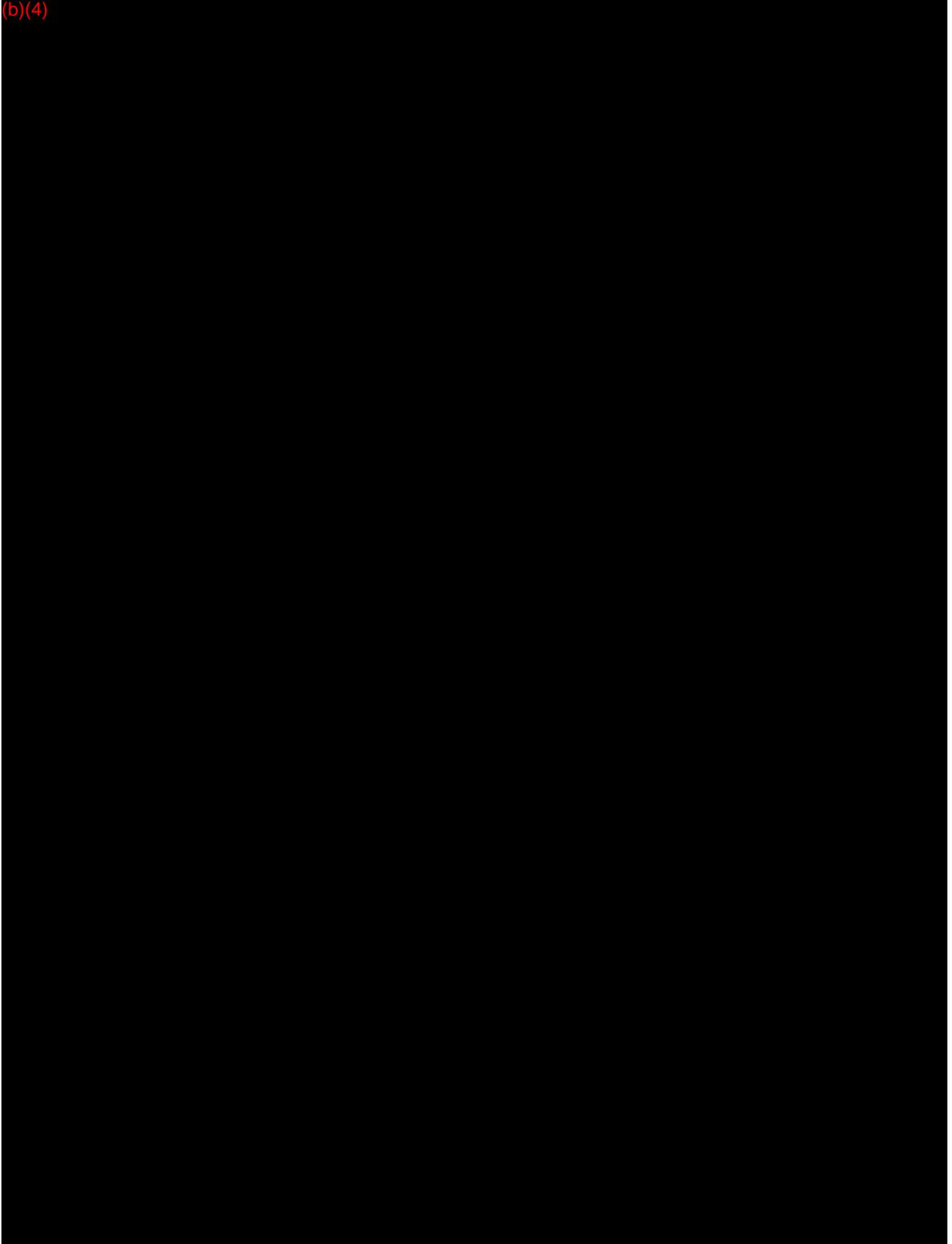
(b)(4)



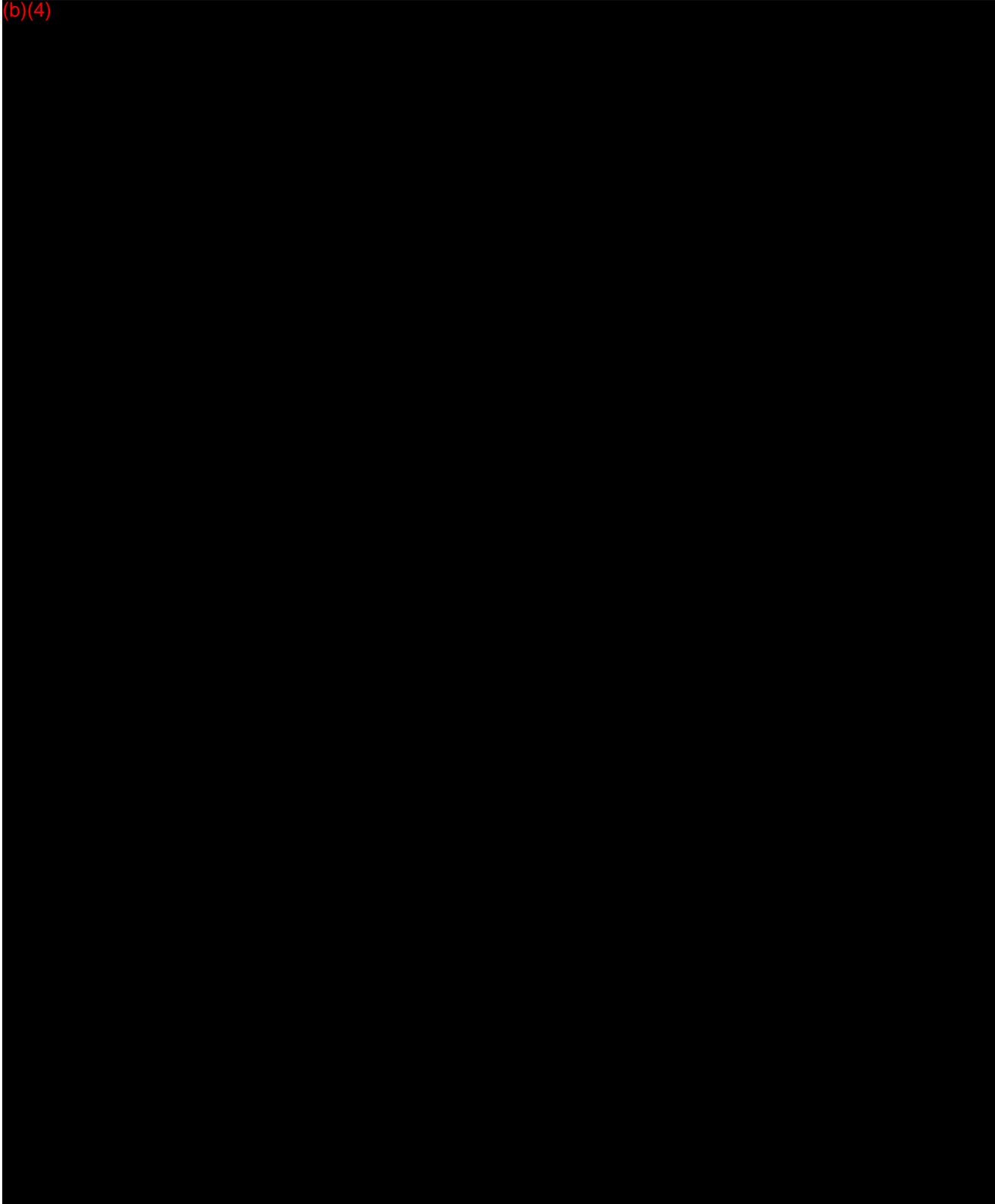
(b)(4)



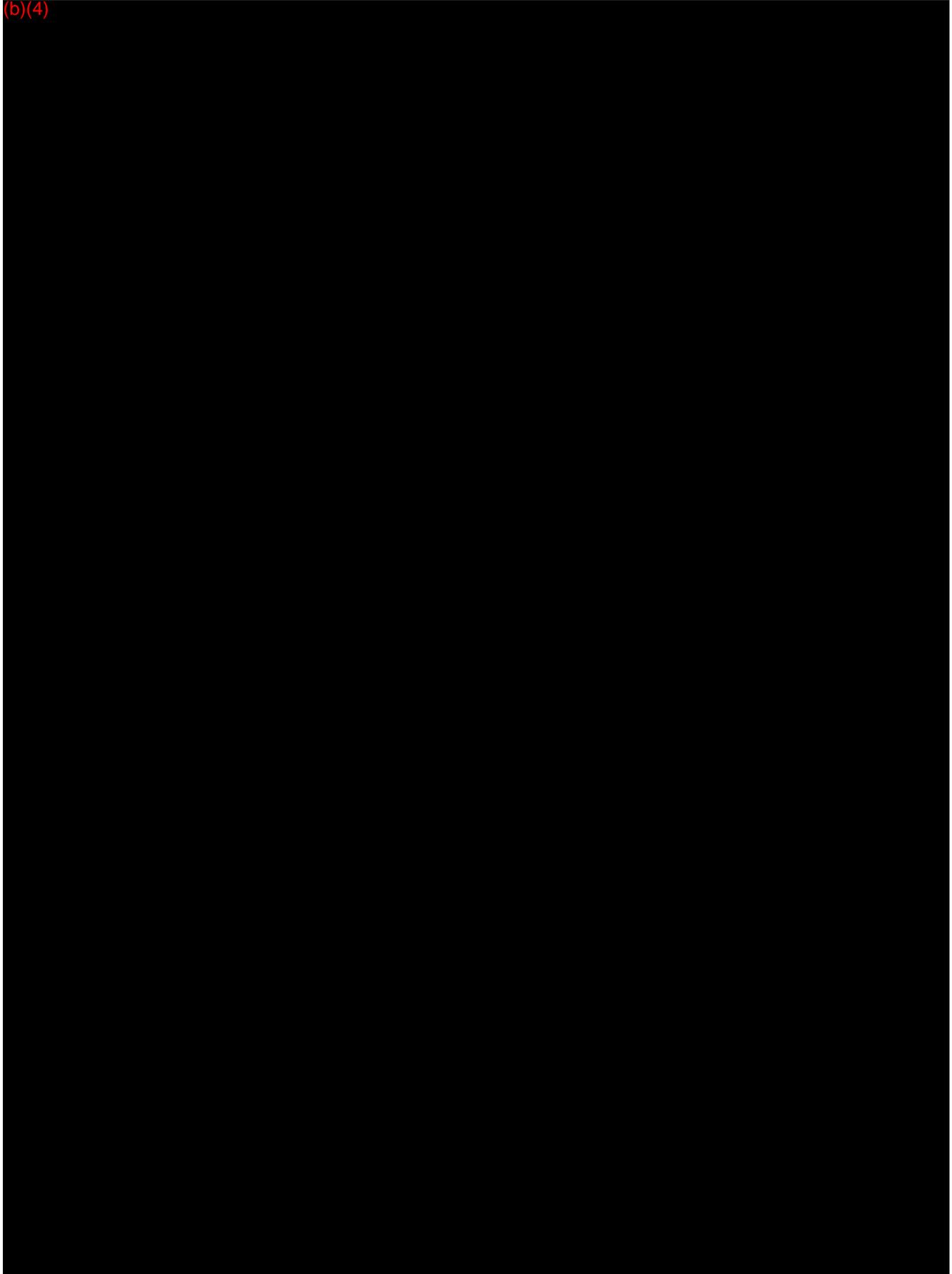
(b)(4)



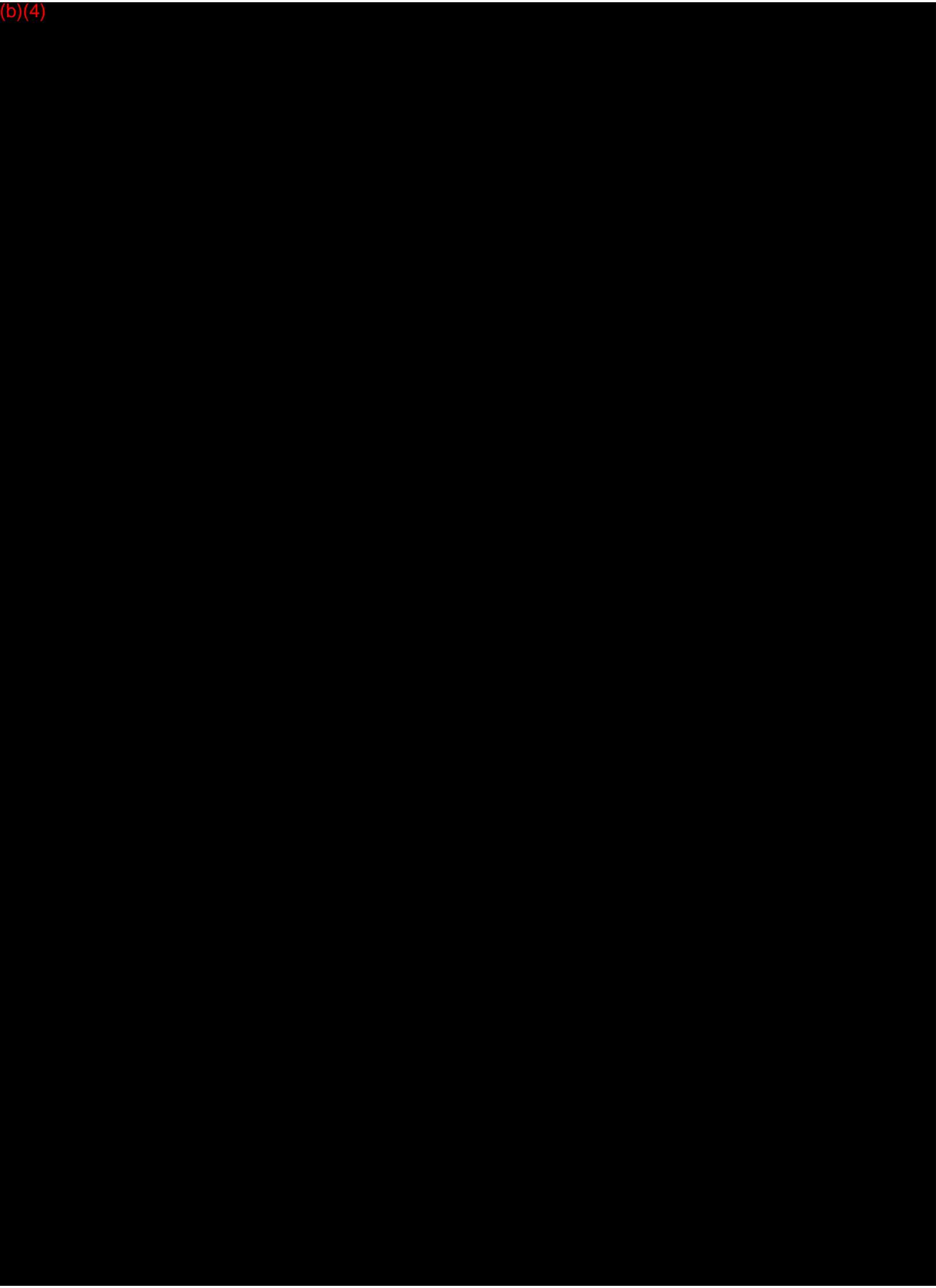
(b)(4)



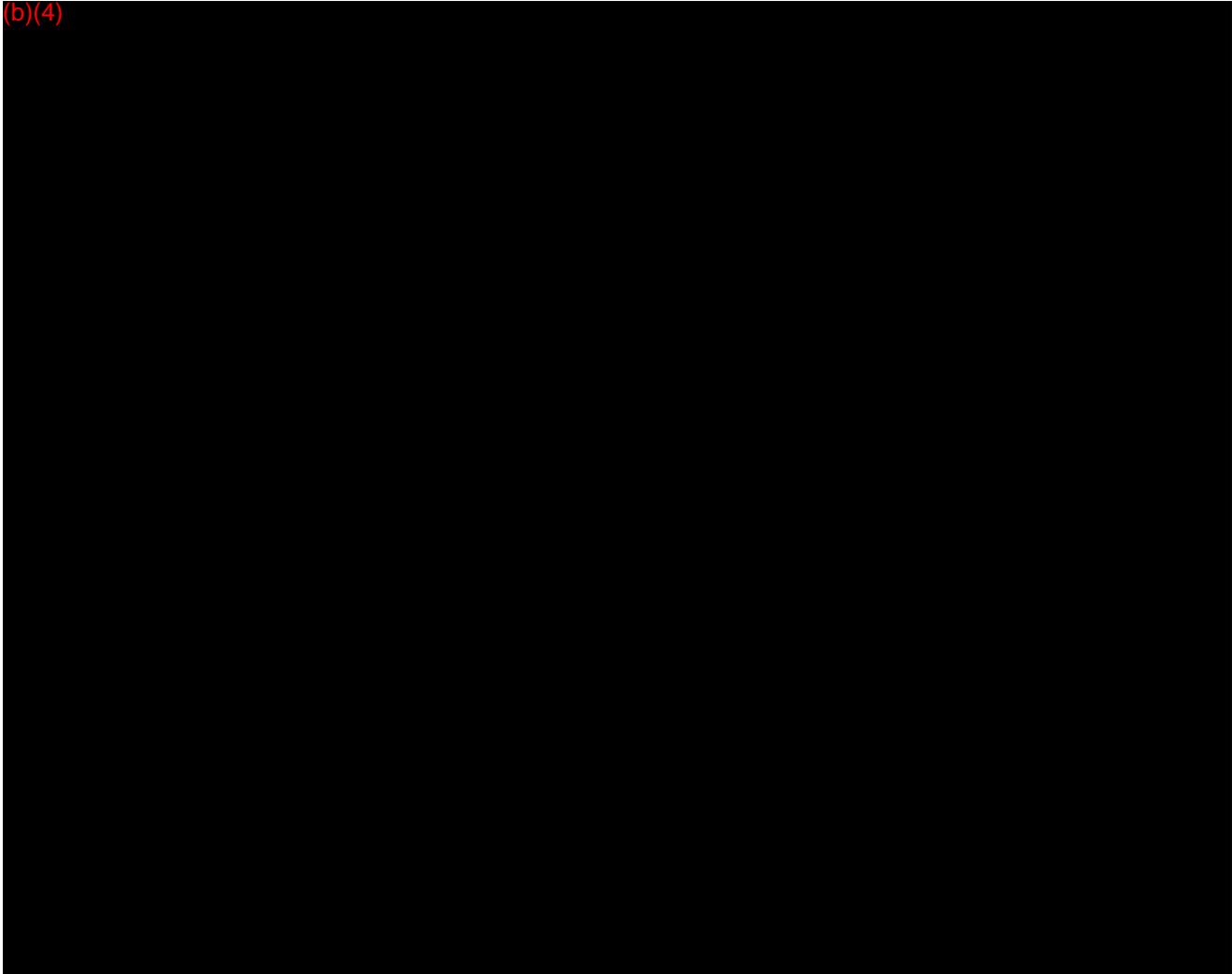
(b)(4)



(b)(4)



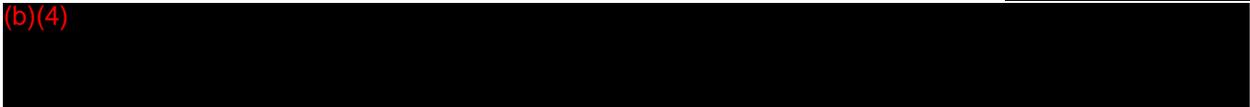
(b)(4)



#### 4.4.1.7 Sterilization

LC Bead/ Bead Block are labeled as “Sterile” SAL is  $10^{-6}$  and in accordance with AAMI/ANSI/ISO 17665 Part1: Sterilization of health care products Requirements for validation and routine control-Industrial moist heat sterilization, 2ed. (b)(4)

(b)(4)



(b)(4)



#### 4.4.1.8 Extractables

(b)(4)



#### 4.4.1.9 Pyrogenicity

LC Bead/ Bead Block are labeled as “Non-Pyrogenic” Pyrogenicity and presence of endotoxins are determined using the Kinetic-Chromogenic LAL method. Endotoxin testing is performed by Lonza (formally Cambrex), Belgium. Test methods used are validated by Lonza. Each lot of LC Bead and/or Bead Block is tested to meet the requirement of <0.06 EU/ML in accordance with the requirements of the FDA 1987 Guidance Document: Guideline on Validation of Limulus Amebocyte Lysate Test as an End Product Endotoxin Test for Human and Animal Parenteral Drugs, Biological Products and Medical Devices.

### 4.5 Packaging Materials

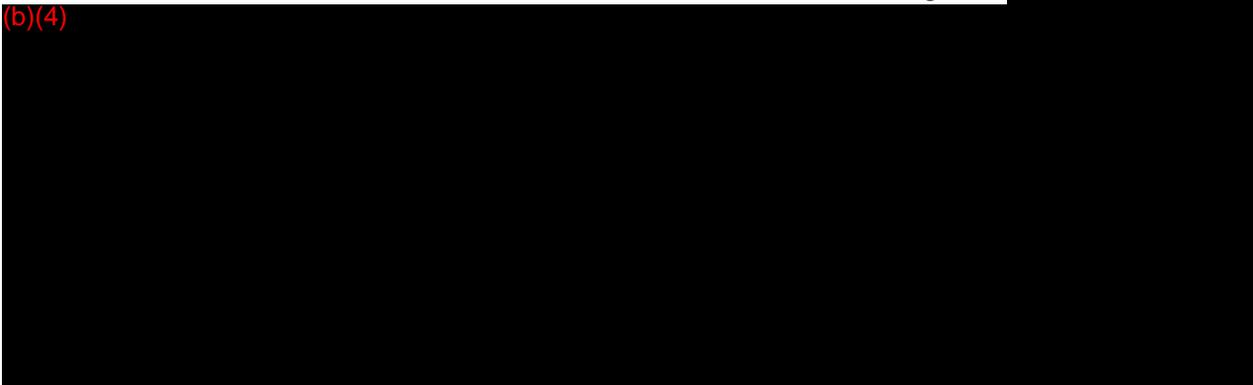
#### 4.5.1 Vial Description

The vials used with LC Bead are 10mL made of borosilicate clear glass.

(b)(4)



(b)(4)



## 4.5.2 Syringe Description

The syringes used with Bead Block are 20ml with clear polycarbonate barrel and colored polycarbonate plunger and white printing of graduation marks. (b)(4)

(b)(4)

## 4.5.3 External Packaging

### 4.5.3.1 External Packaging for Vials

Vials containing LC Bead are packaged in a cardboard box. There is no sterile barrier between the box and the outside surface of the vial (Section 7).

### 4.5.3.2 External Packaging for Syringes

Syringes containing Bead Block are packaged in a molded polycarbonate tray with a Tyvek lid. The syringe and contents are sterile. The Tyvek lid stock serves as a sterile barrier. Package labeling is provided in Section 7 of this Premarket Notification.

## 4.6 Device Interfaces

### 4.6.1 Catheter Delivery

LC Bead and Bead Block have been tested for compatibility with a variety of commonly used microcatheters (table 4.5) A copy of the protocol used for this testing was included in K033761. The compatibility testing protocol includes evaluation of the following properties:

- Aggregation of the embolic agent in the syringe
- Catheter clogging
- Ease of delivery
- Shape of the embolic agent after injection

Catheter I.D. ("/μm)	Microcatheter	LC Bead/ Bead Block Model	Compatible LC Bead/Bead Block Size(s) (μm)				
			100-300	300-500	500-700	700-900	900-1200
0.024/610 and up	5Fr. AngioDynamics	S Series					
		V Series					
	FasTracker® 325	S Series					
	5Fr. AngioDynamics	V Series					
0.021/540	FasTracker 18	S Series					
	Cook 3.0 Fr.	V Series					
0.016/420	Prowler® 14	S Series					
		V Series					
0.022/570	2.4Fr Progreat™ Terumo	<b>S Series</b>					
		<b>V Series</b>					
0.018/457	Spinnaker Elite™ 1.8	S Series					
		V Series					

**Table 4-5** Catheter Compatibility

Biocompatibles does not intend to make recommendations for the use of LC Bead/ Bead Block with specific catheter models. The above information will be provided to customers as a guide to the range of microcatheters tested for compatibility with the LC Bead and Bead Block products.

## 5 Device Modifications & Comparative Information

### 5.1 Predicate Devices

#### 510K Numbers and Product Codes of Equivalent Devices

Biocompatibles, UK Ltd

LC Bead Microspheres

Bead Block Compressible Microspheres

510K Number: K042231 (K083091 added KRD Code)

Product Code: HCG/KRD

CFR Section: 882.5950/870.3300 (both codes are sought in this Premarket Notification)

### 5.2 Discussion of Similarities and Differences between LC Bead and Predicate Devices

This sections outlines the similarities and areas where LC Bead may differ from the predicate devices under the following sub headings.

#### 5.2.1 Indications for Use

LC Bead Microspheres Embolic Agent, and Bead Block have the same indications for use.

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

#### 5.2.2 Target Population

The clinical application of LC Bead/ Bead Block and the predicate devices is the same, ie treatment of hypervascular tumors and arteriovenous malformations (AVM's). LC Bead/Bead Block and the predicate devices are intended to be delivered to selected sites through catheters with a diameter appropriate for the vascular target and the size of the beads being used. Accurate placement of all of all embolic agents is assured through visualization of the embolization process using radiographic imaging LC Bead,

Bead Block and the predicate device are mixed with a radio opaque contrast agent prior to injection to permit visualization. LC Bead/ Bead Block and the predicate device are available in a range of sizes to permit selection of the most appropriate size for the target vessels. LC Bead, Bead Block and the predicate devices are intended for single use and are supplied sterile and non pyrogenic. The addition of the new range of sizes is a subset of the legally marketed product under K083091 & K042231. There is no change to the intended use of the product with the addition of this size range.

### 5.2.3 Product Labeling

Aside from the difference in size ranges offered, the labeling is updated from K083091 the most recent 510K preceding this Premarket Notification. Indications, warnings and contraindications for LC Bead/Bead Block are the same as for the predicate device. The updates to the warnings and precautions are applicable to all sizes of LC Bead/Bead Block.

### 5.2.4 Packaging

LC Bead/Bead Block are supplied in glass vials and syringes respectively. There are no changes to the packaging materials used. The only difference between the size range in this Premarket Notification is the use of a turquoise label and white vial cap. A picture of the new size range vial and packaging is provided below in figure 5-1.



**Figure 5-1:** Picture of 70µm-150µm beads in vial with packaging

#### **5.2.4.1 Catheter Delivery**

Catheter delivery performance is unchanged from K083091, however a different catheter was used in validation testing. Table 5.1 shows the additional (2.4 Fr catheter) added to the catheter compatibility table provided in K083091, highlighted in italics.

Catheter I.D. ("/ $\mu$ m)	microcatheter	LC Bead Bead Block Model	Compatible LC Bead/Bead Block Size(s) ( $\mu$ m)					
			70-150	100-300	300-500	500-700	700-900	900-1200
0.024/610 and up	5Fr. AngioDynamics	S Series						
		V Series						
	5Fr. AngioDynamics	FasTracker® 325 S Series						
		V Series						
0.021/540	FasTracker 18 Cook 3.0 Fr.	S Series						
		V Series						
0.016/420	Prowler® 14	S Series						
		V Series						
0.022/570	2.4Fr Progreat™ Terumo	S Series						
		V Series						
0.018/457	Spinnaker Elite™ 1.8	S Series						
		V Series						

Table 5-1 Microcatheter Compatibility.

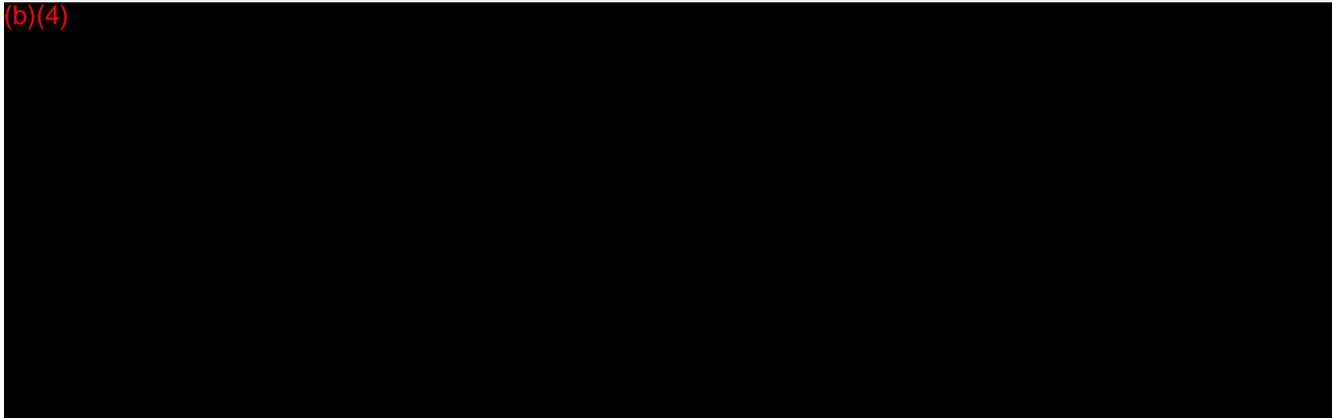
**5.2.5 Performance Testing**

FDA published Special controls for Neurological Embolization devices in February 2004. LC Bead and Bead Block compressible conform to these requirements (Section 3).

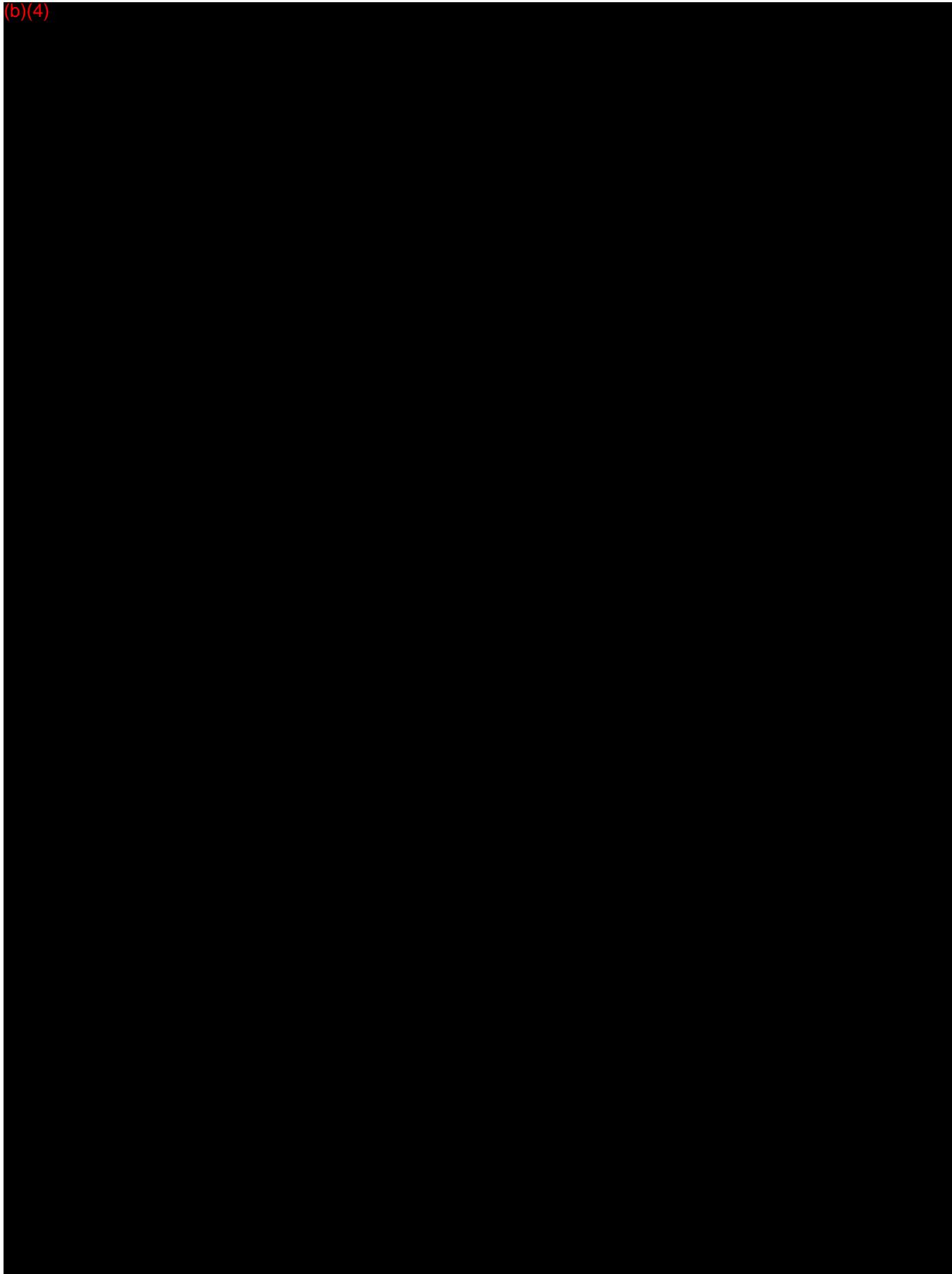
**5.2.6 Safety Characteristics**

The safety characteristics (physical characteristics, biocompatibility, sterility, endotoxin, etc) are the same for LC Bead in the size range of 70 -150 $\mu$ m and the predicate device. It is noted that the new size range of 70-150 $\mu$ m is a subset of the 100-300 $\mu$ m size range of the legally marketed predicate. No new characteristics are added which would have an effect on product safety, effectiveness or the ability of the product to meet the relevant standards or specifications as described in K083091.

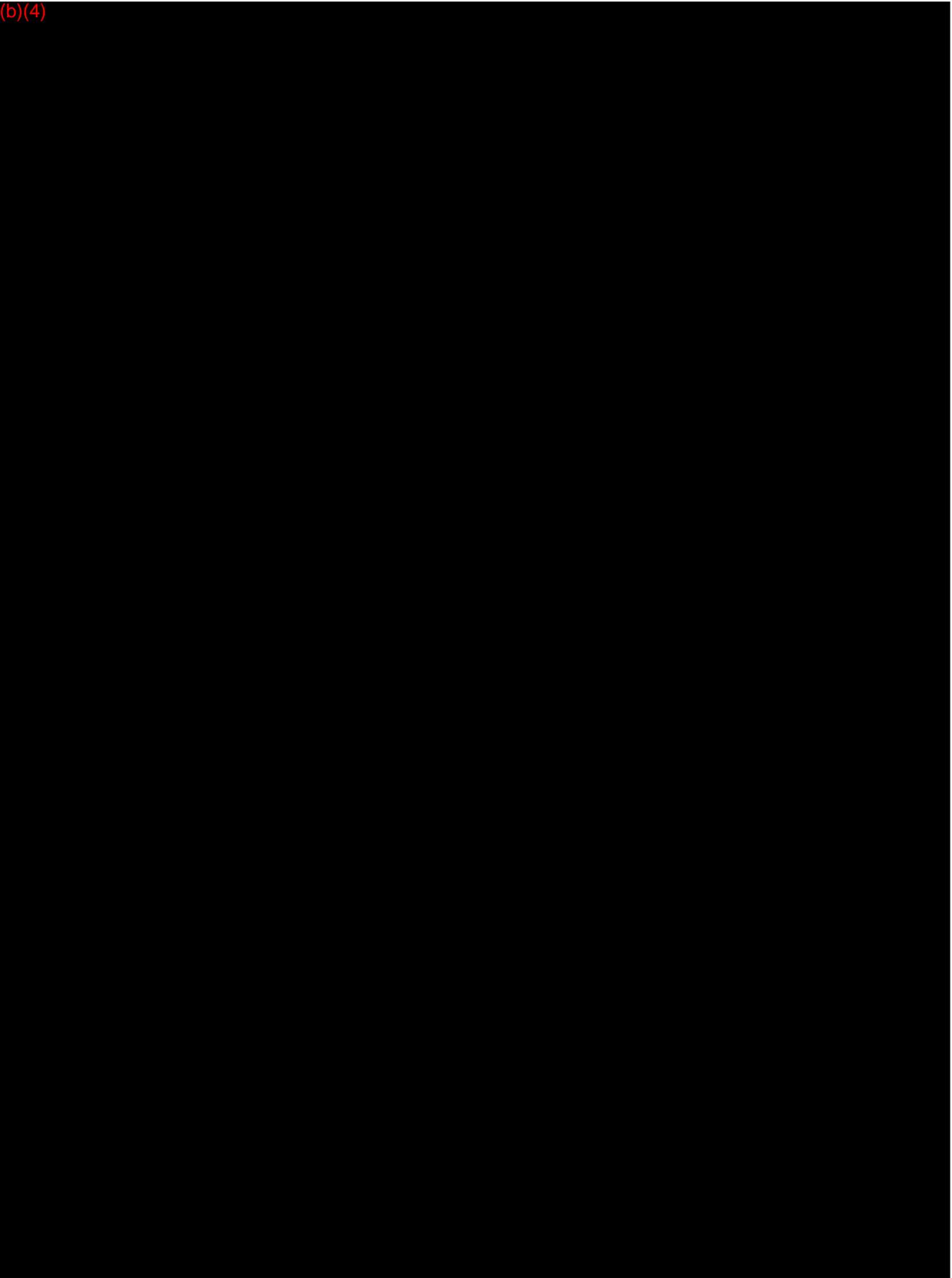
(b)(4)



(b)(4)



(b)(4)



	<b>LC Bead Microspheres K042231 &amp; K083091 (Predicate)</b>	<b>LC Bead Microspheres Small beads (70 – 150µm) (New)</b>
<b>Device Description</b>	Calibrated microspheres for embolization Blue dyed	Calibrated microspheres for embolization Blue dyed
<b>Safety &amp; Standards</b>	<p>Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products</p> <p>ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing</p> <p>ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.</p> <p>ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.</p> <p>ISO/EN 10993-5; 1993 Biological Evaluation of Medical Devices, Part 5: Tests for In Vitro Cytotoxicity</p> <p>ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.</p> <p>ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.</p> <p>ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.</p> <p>ISO/EN 11607; 1997 – Packaging for terminally sterilized products.</p> <p>AAMI 11134; 1993 – Sterilization of Health Care Products – Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.</p> <p>ANSI/AAMI/ISO 14937; 2000 – Sterilization of Health Care Products – Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.</p> <p>EN 554: Sterilization of Medical Devices – validation and Routine Control of Sterilization by Moist Heat</p> <p>ISO 14971: Medical Devices – Risk Management</p>	<p>Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products</p> <p>ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing</p> <p>ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.</p> <p>ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.</p> <p>ISO/EN 10993-5; 1993 Biological Evaluation of Medical Devices, Part 5: Tests for In Vitro Cytotoxicity</p> <p>ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.</p> <p>ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.</p> <p>ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.</p> <p>ISO/EN 11607; 1997 – Packaging for terminally sterilized products.</p> <p>ANSI/AAMI/ISO 14937 2000 Sterilization of Healthcare Products – Moist Heat- Part 1: Requirement for the Development, Validation and routine control of a sterilization process for medical devices</p> <p>ANSI/AAMI/ISO 14937; 2000 – Sterilization of Health Care Products – Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.</p> <p>ISO 14971: Medical Devices – Risk Management</p>
<b>Indications for Use</b>	"LC Bead and Bead Block™ Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."	"LC Bead and Bead Block™ Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."
<b>Expiration</b>	4 years	4 years
<b>Size Range</b>	5 size ranges up to 1200µm	6 size ranges up to 1200µm including the new size range 70-150µm
<b>Sterility</b>	SAL 10 <sup>-6</sup> ; Steam	SAL 10 <sup>-6</sup> ; Steam
<b>Packaging</b>	Vial, non sterile package	Vial, non sterile package
<b>Composition</b>	PVA, Reactive Blue Dye , buffered saline	PVA, Reactive Blue Dye , buffered saline
<b>USE</b>	Single Use Only	Single Use Only
<b>Delivery Method</b>	Intravascular catheter	Intravascular catheter

**Table 5.4** Overall comparison of the predicate device and the 70-150 µm LC Bead product

## 6 Process Verification/Validation

Technical characteristic and specifications are identical to the predicate device. Technical characteristics and specifications were added for this bead size and included in the Device Master Record (b)(4)

(b)(4)

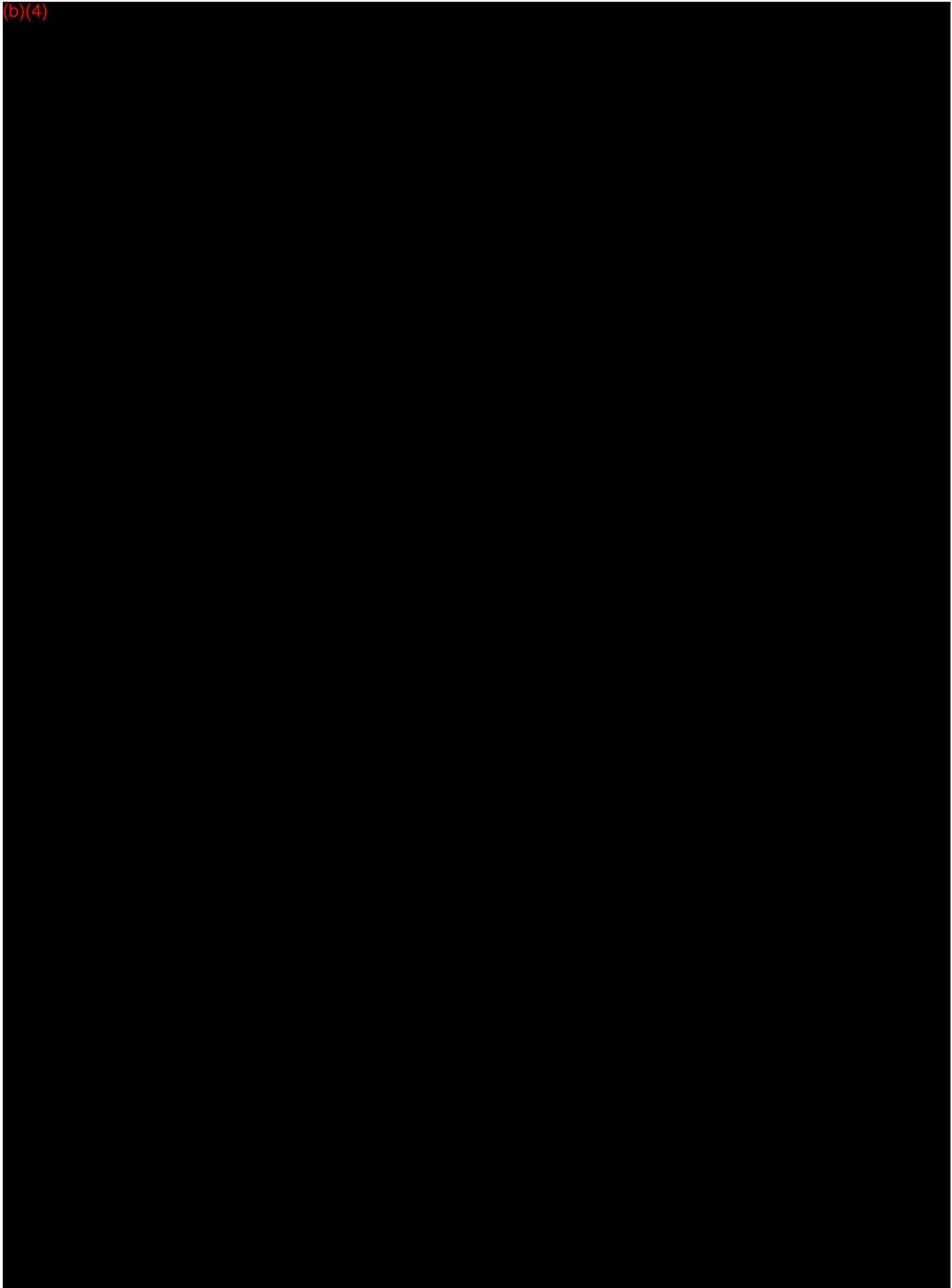
### 6.1 Summary

Physical and chemical characteristics are identical to the predicate device, with the exception of bead size range. (b)(4)

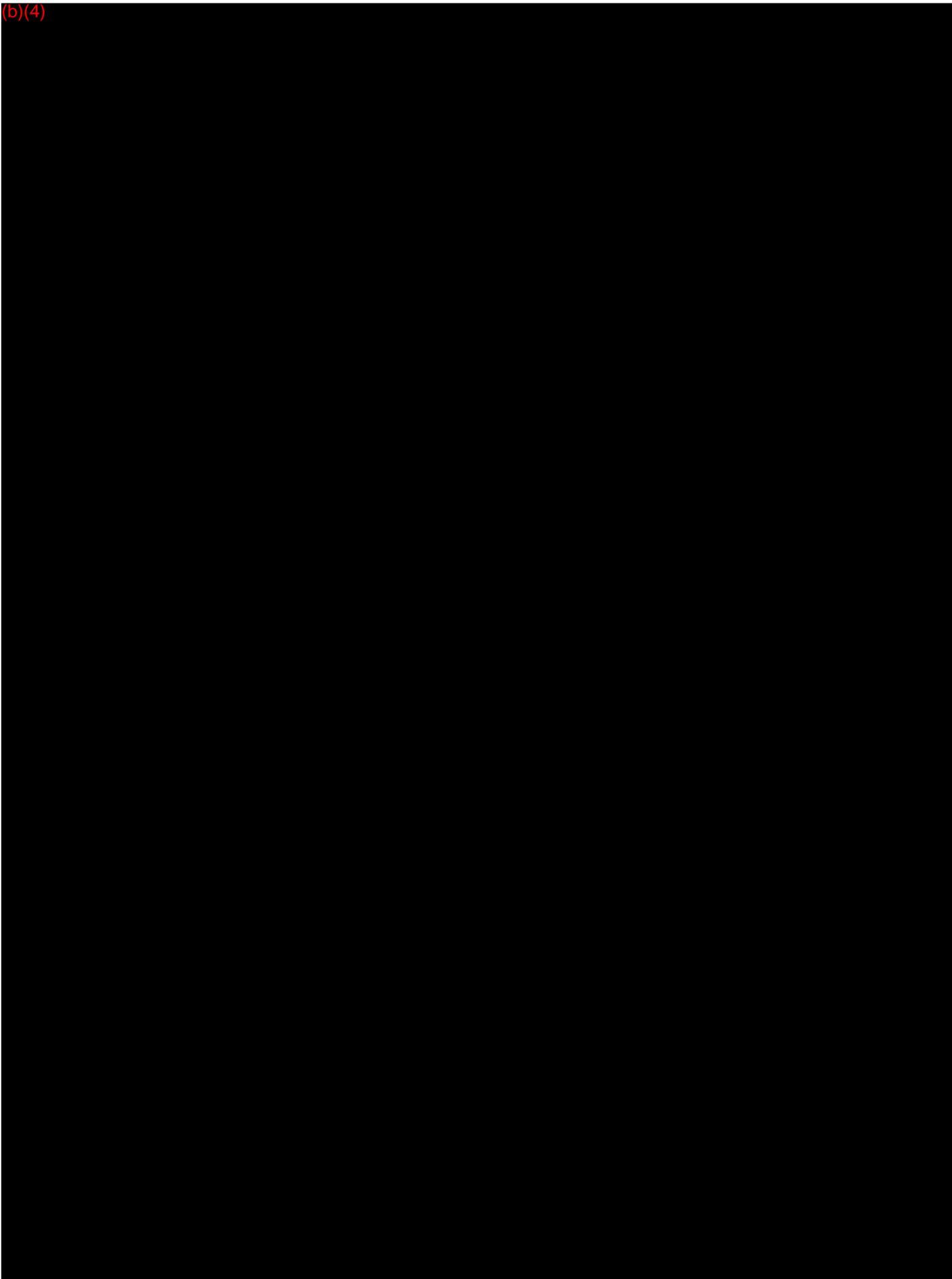
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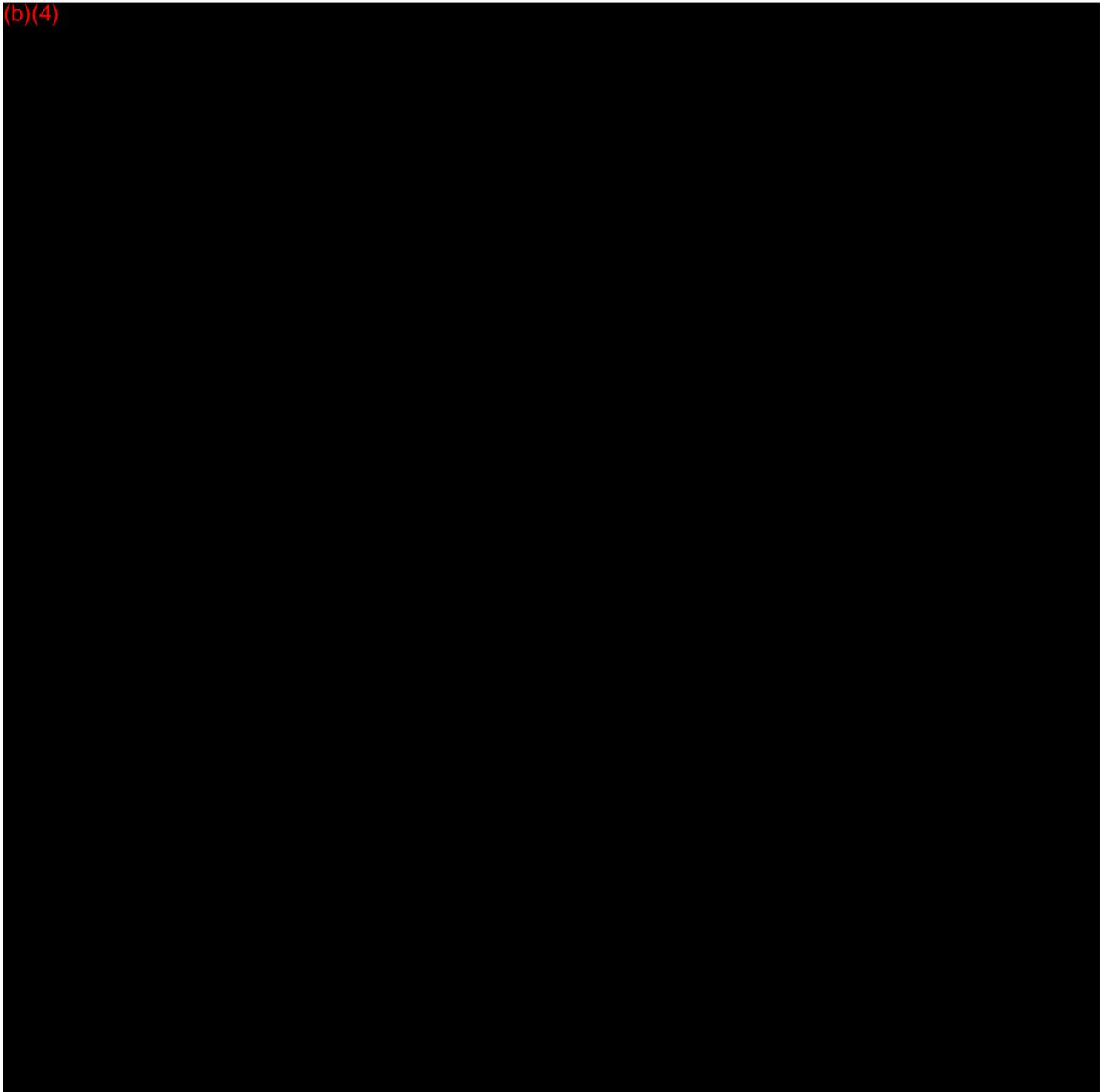
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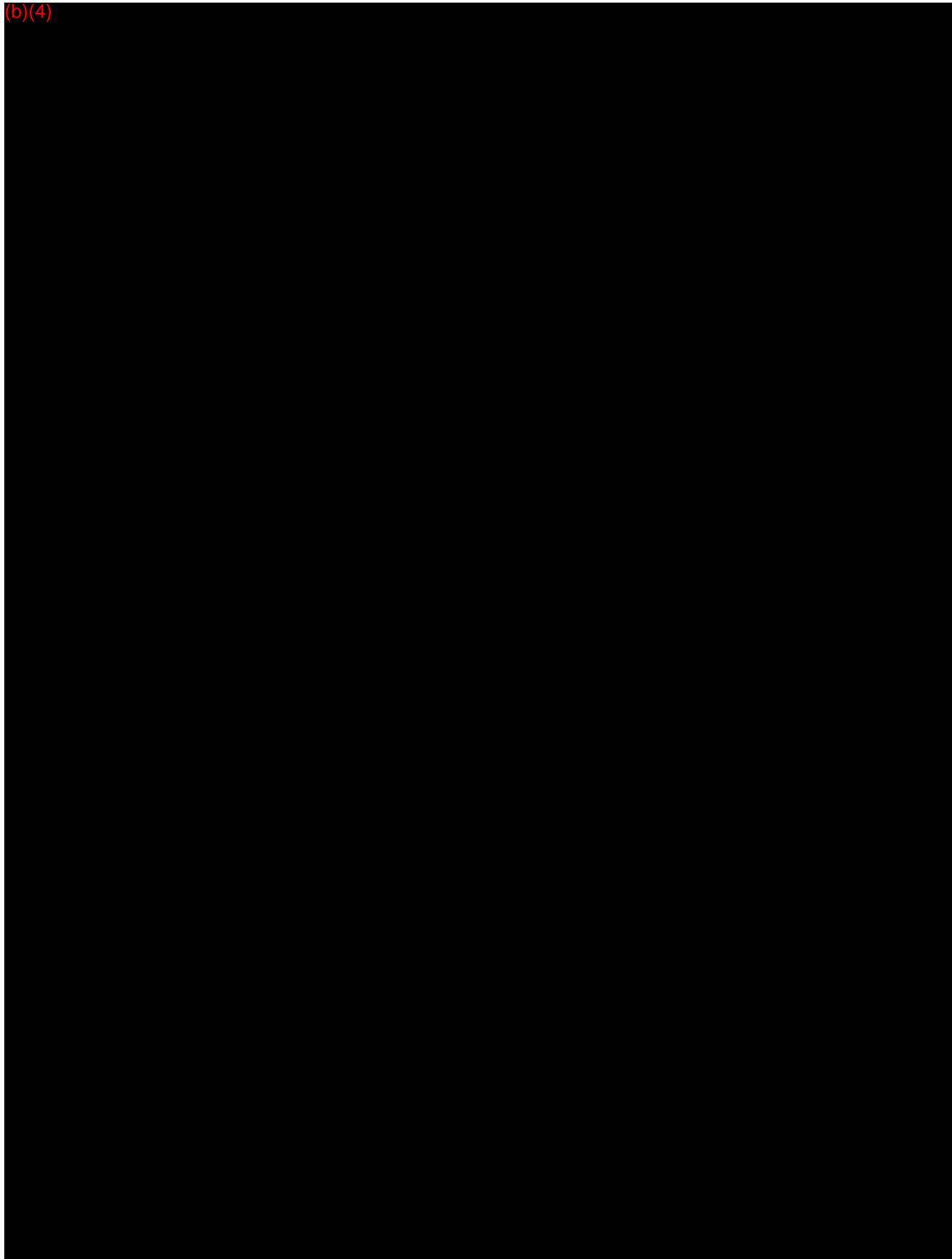
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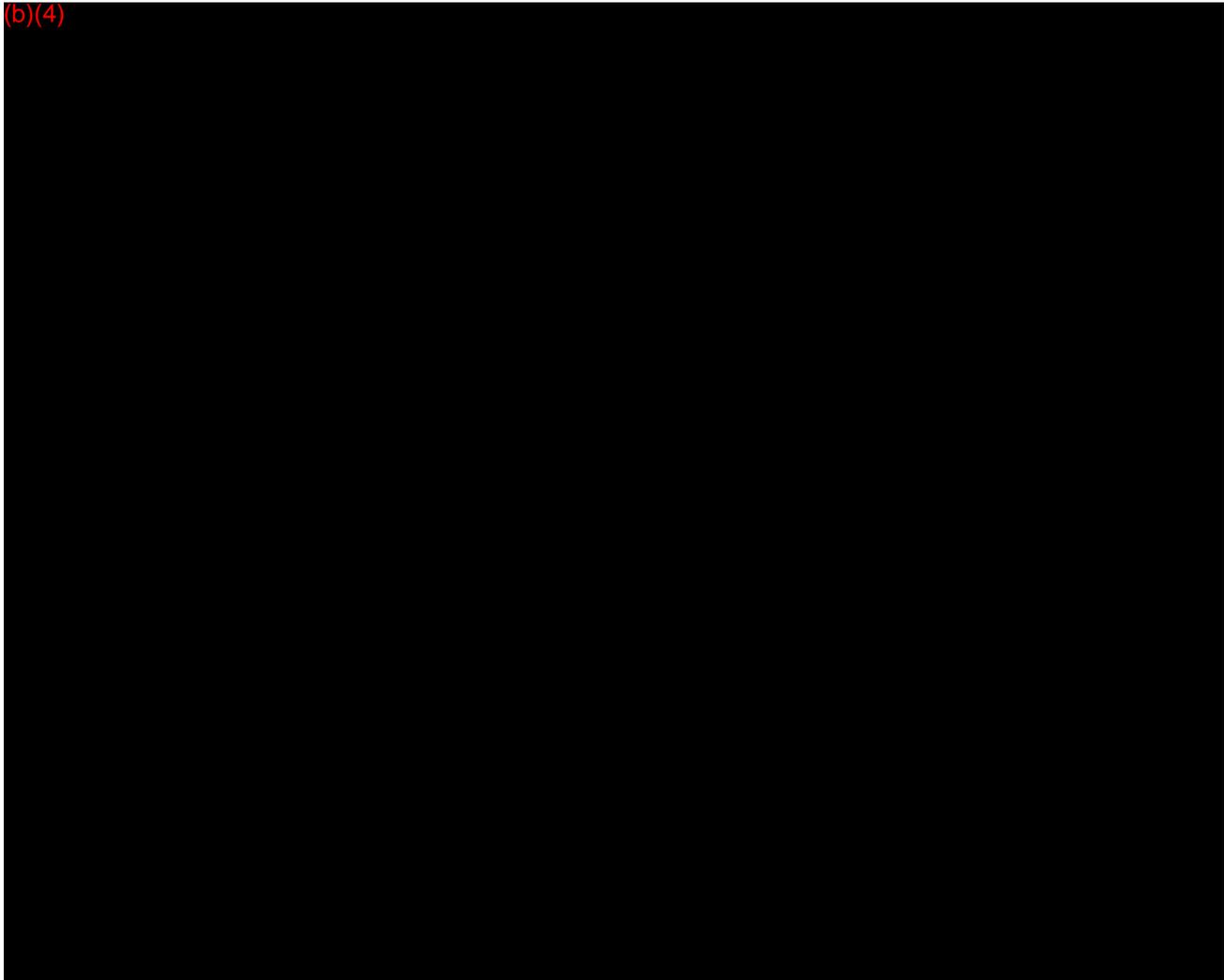
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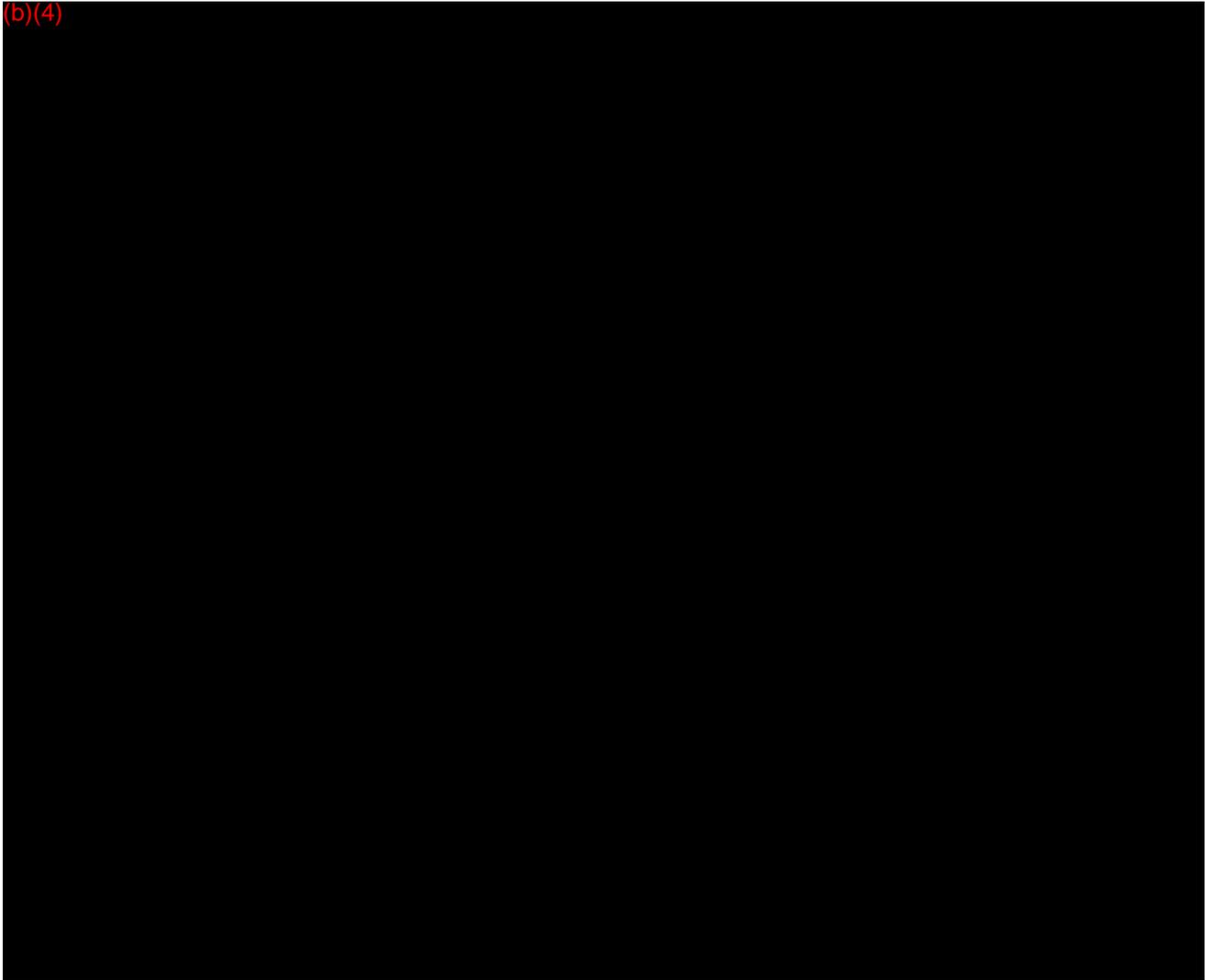
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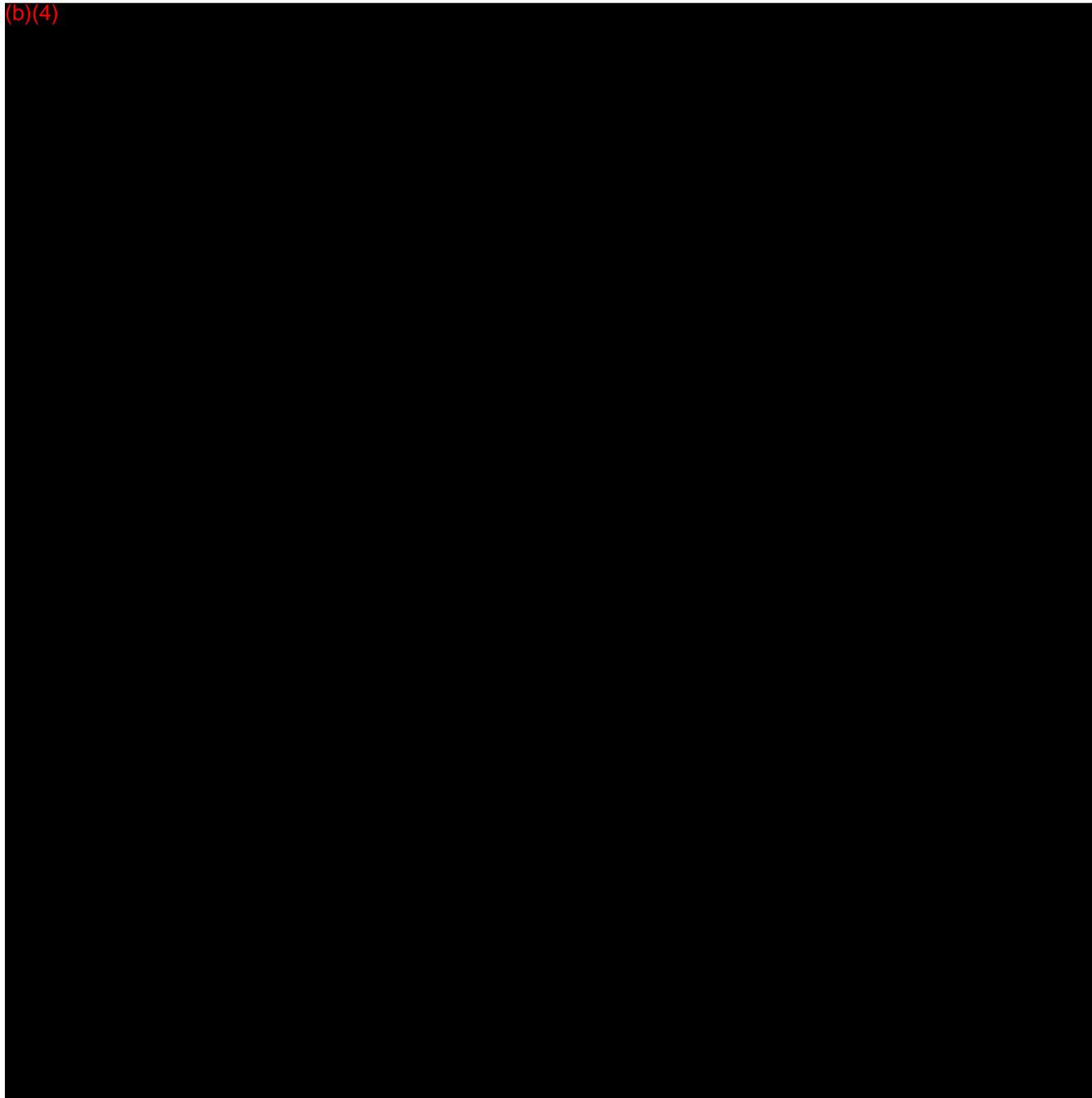
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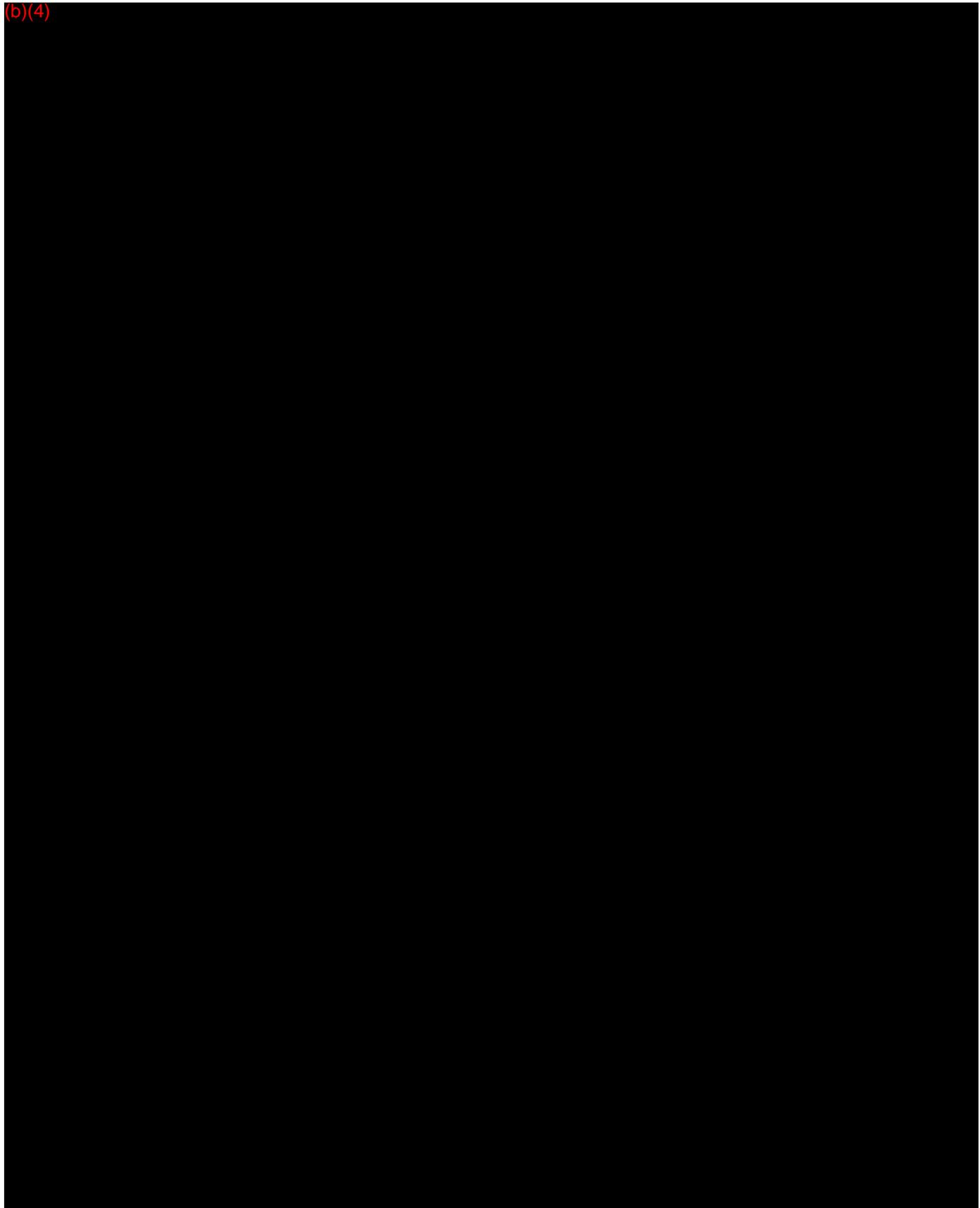


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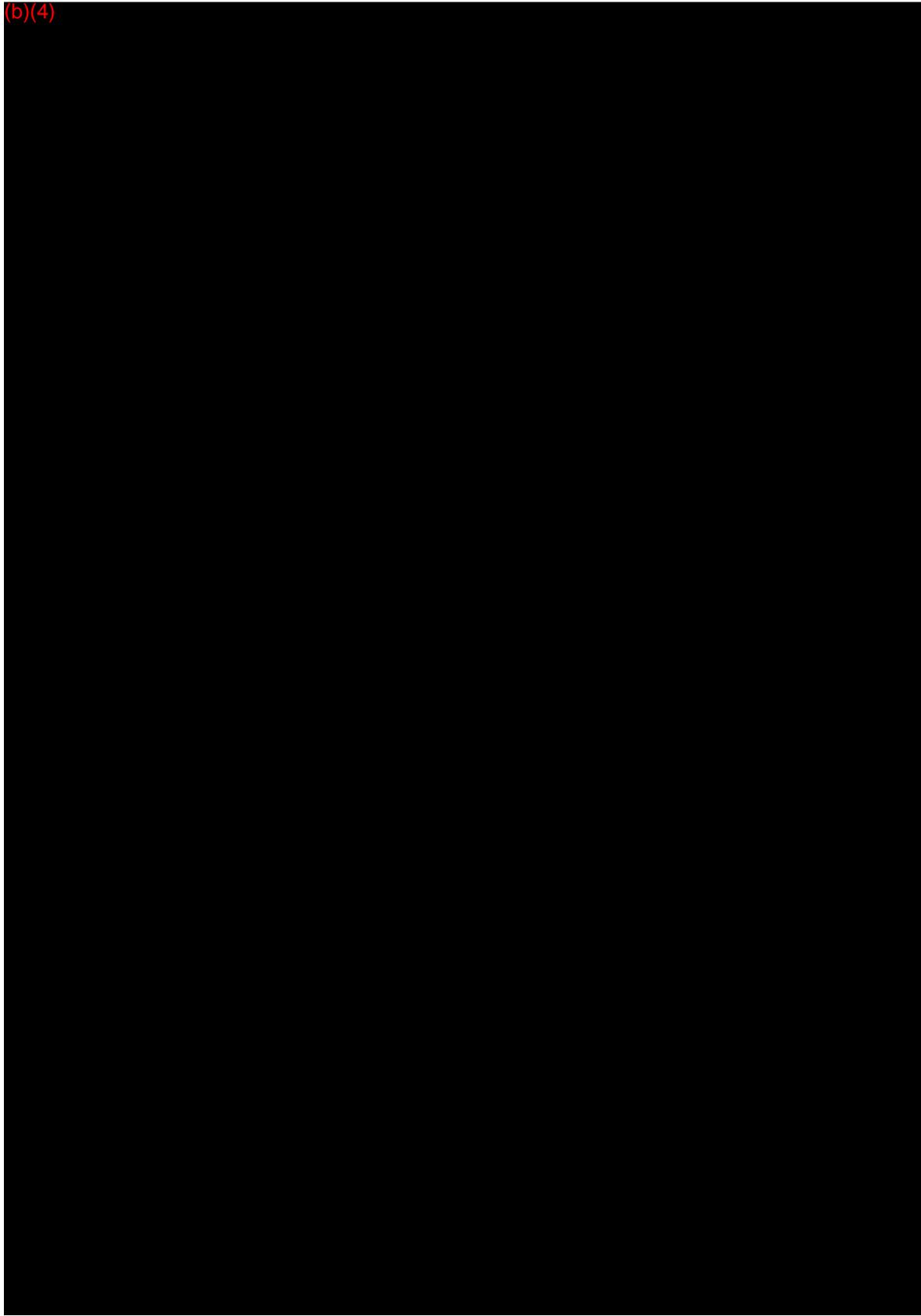




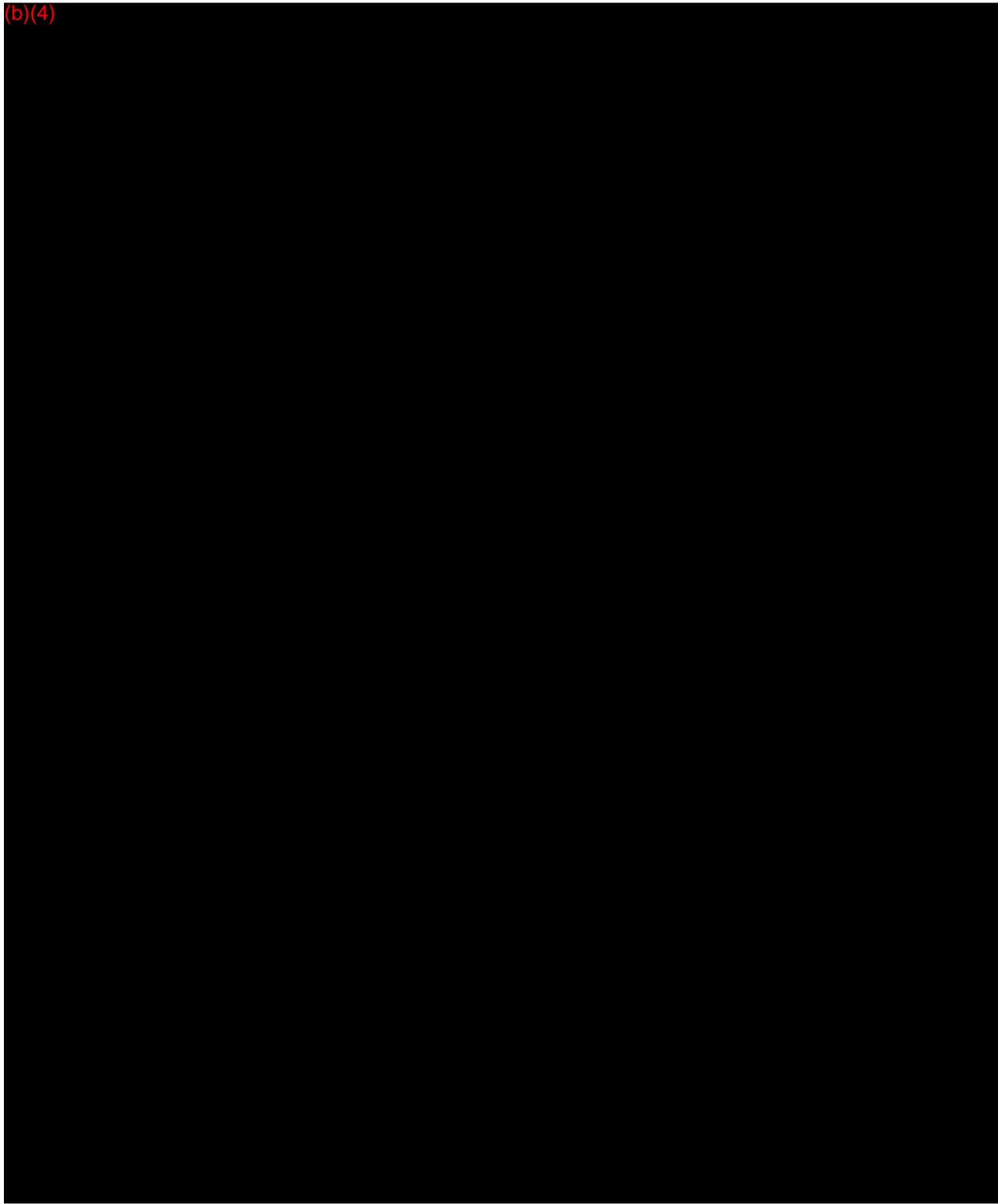
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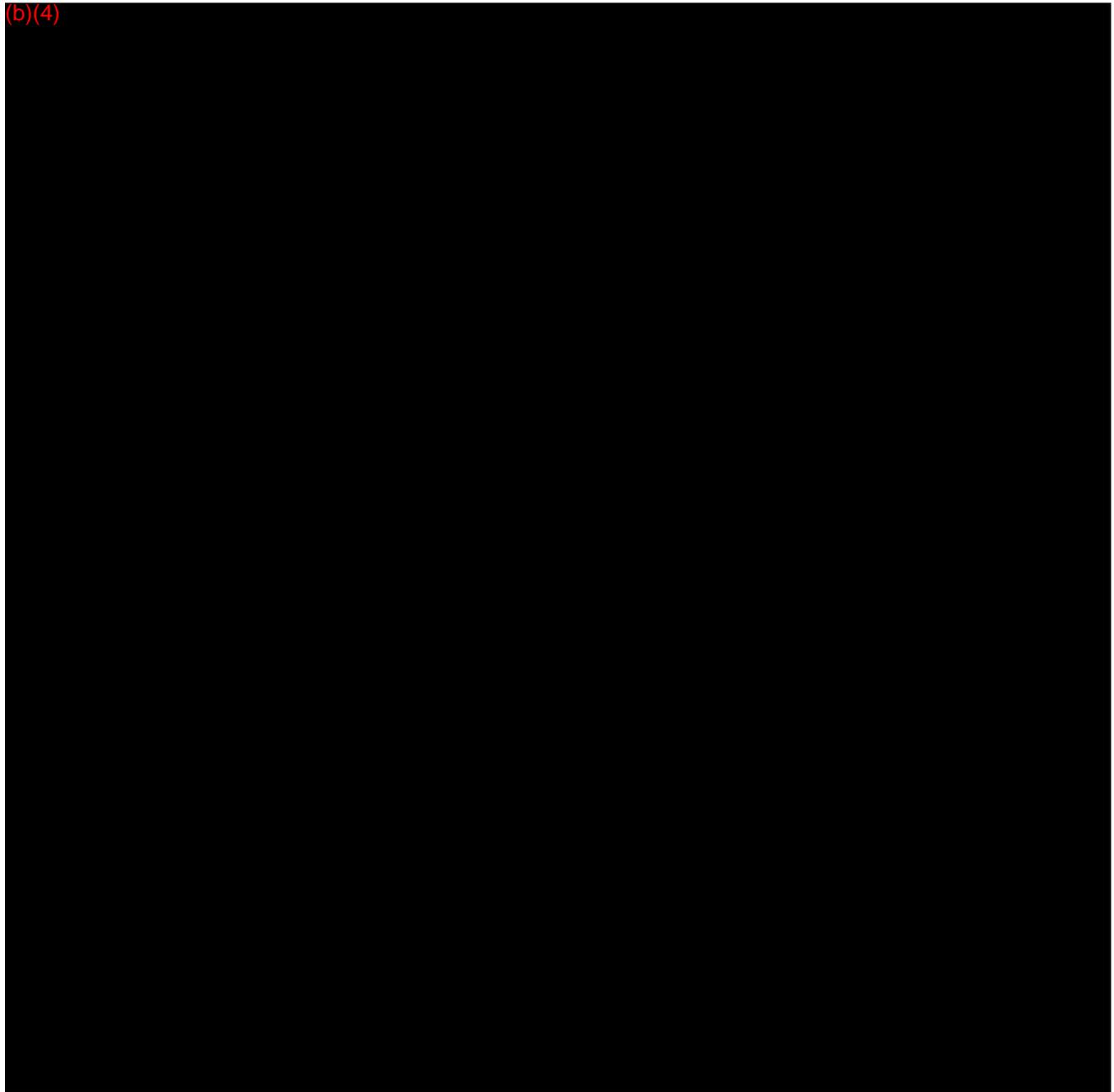


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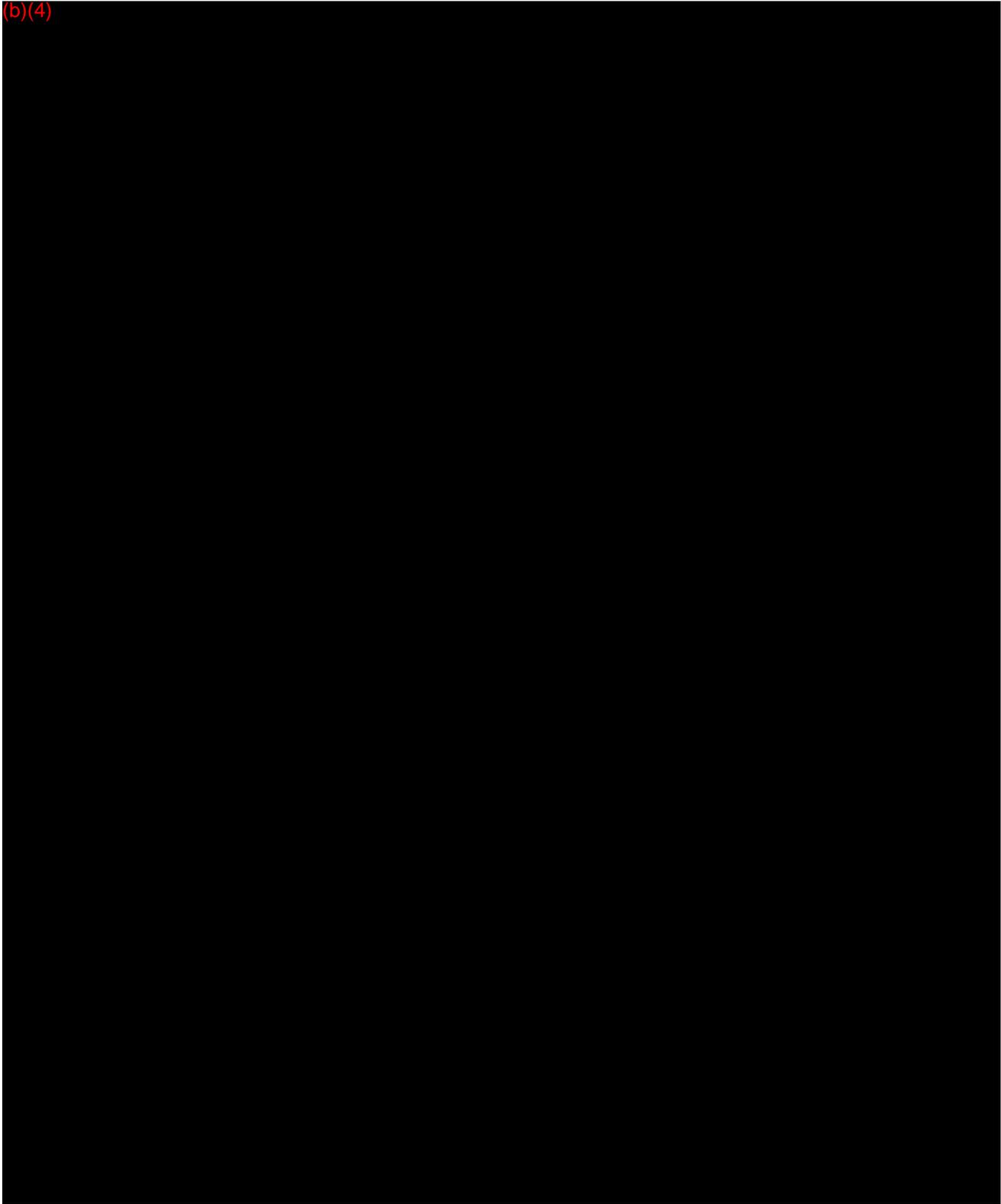


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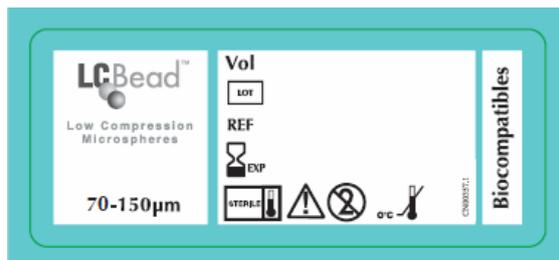
## 7 Labeling

Sample labels for small size versions of 70-150µm LC Bead are shown below.

### 7.1 Package Labels

#### 7.1.1 Labeling for LC Bead

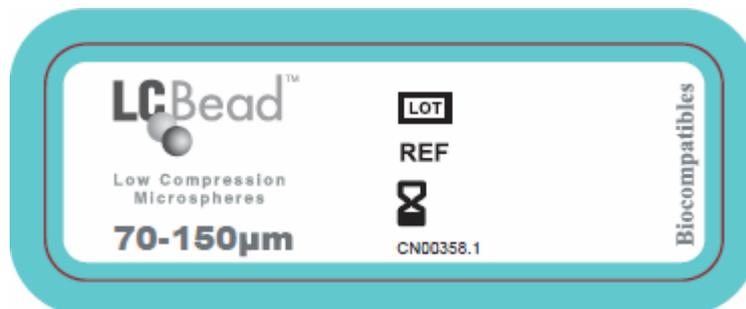
##### Vial Label



##### Carton Label



##### Patient Label



## **7.2 Instructions For Use**

This section describes the Instructions for Use of the LC Bead product.

### **7.2.1 Instructions for Use (IFU) for LC Bead**

IFU is described in Appendix IV

## 8 Summary of Design Control Activities

### 8.1 Verification & Validation

#### 8.1.1 Summary Statement

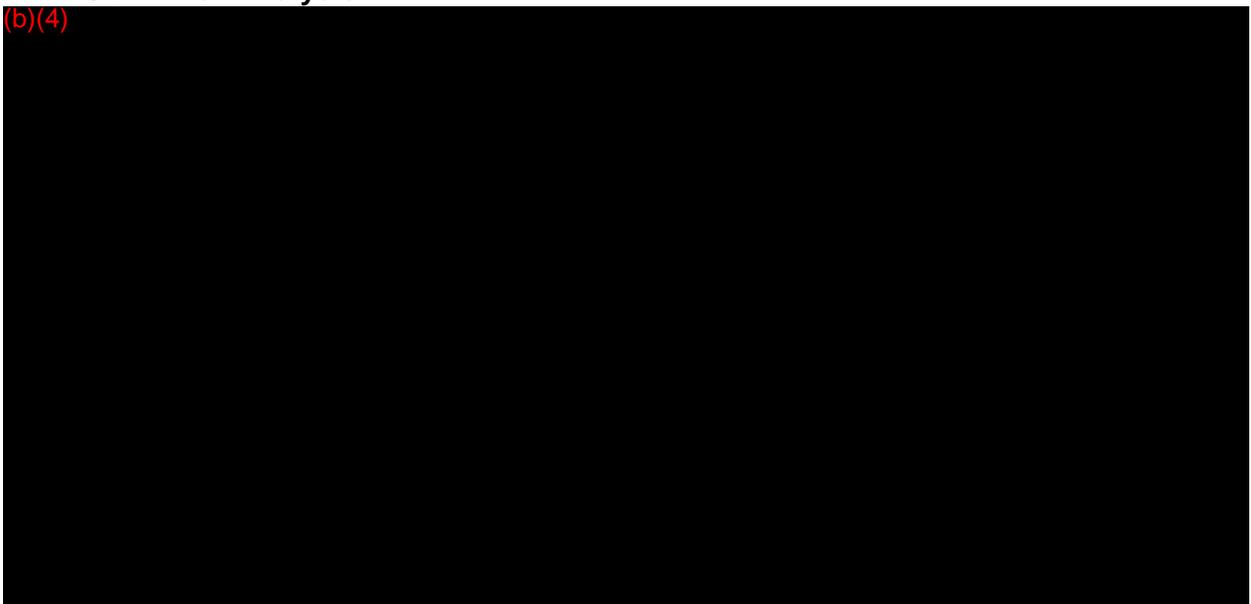
Biocompatibles UK Ltd utilizes written procedures which define the Design and Development processes. These processes are defined in Biocompatibles UK Ltd Design Controls Procedure CP1024. The activities to develop LC Bead/Bead Block followed the requirements of this Design Control Procedure. The Company maintains written documentation on each element of the Design Control Plan. This documentation is maintained in the Design History File. Table 8.1 shows the major elements of the design documentation which are on file for LC Bead/Bead Block products.

LC Bead/Bead Block DHF Elements
<ul style="list-style-type: none"> <li>• DMR</li> <li>• Project Plan</li> <li>• Product Requirements Document</li> <li>• Risk &amp; FMECA Analysis</li> <li>• Design Specifications</li> <li>• Review Notes</li> <li>• Prototype Review</li> <li>• Verification Plans/Reports/Data</li> <li>• Validation Plans/Reports/Data</li> <li>• Labeling</li> <li>• Design Review/Quality Audit(s)</li> <li>• Reference to Released DCR's</li> </ul>

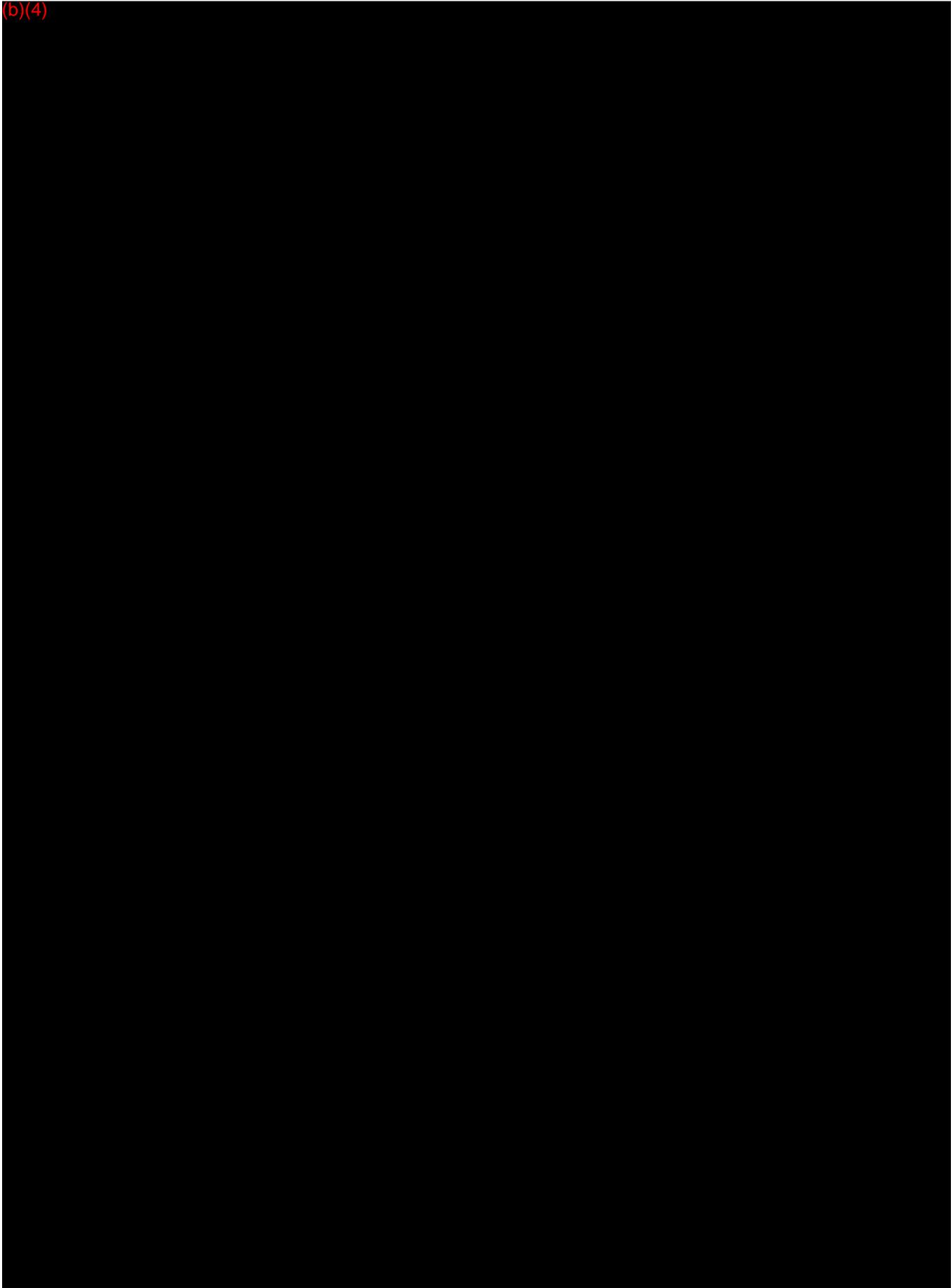
**Table 8.1** Key stages of the design plan included in the Design History File.

### 8.2 Risk Analysis

(b)(4)



(b)(4)



**8.2.1 Design Risk Analysis For 70-150µm LC Bead**

The Product Risk Assessment is described in Appendix III.

**8.3 Verification Activities**

As of the date of filing this Pre-market Notification all verification and validation activities have been completed.

Verification and Validation activities for both LC Bead and Bead Block have been completed as appropriate in accordance with the verification and validation protocols.

A copy of these documents was provided in K042231. (b)(4)  
 (b)(4)

**8.3.1 Specific Verification and Validation Activities**

**8.3.1.1 Biocompatibility**

The biocompatibility testing listed in table 8.3 provides a summary of the testing performed in K023089 (the original 510K for this product line). (b)(4)

(b)(4)

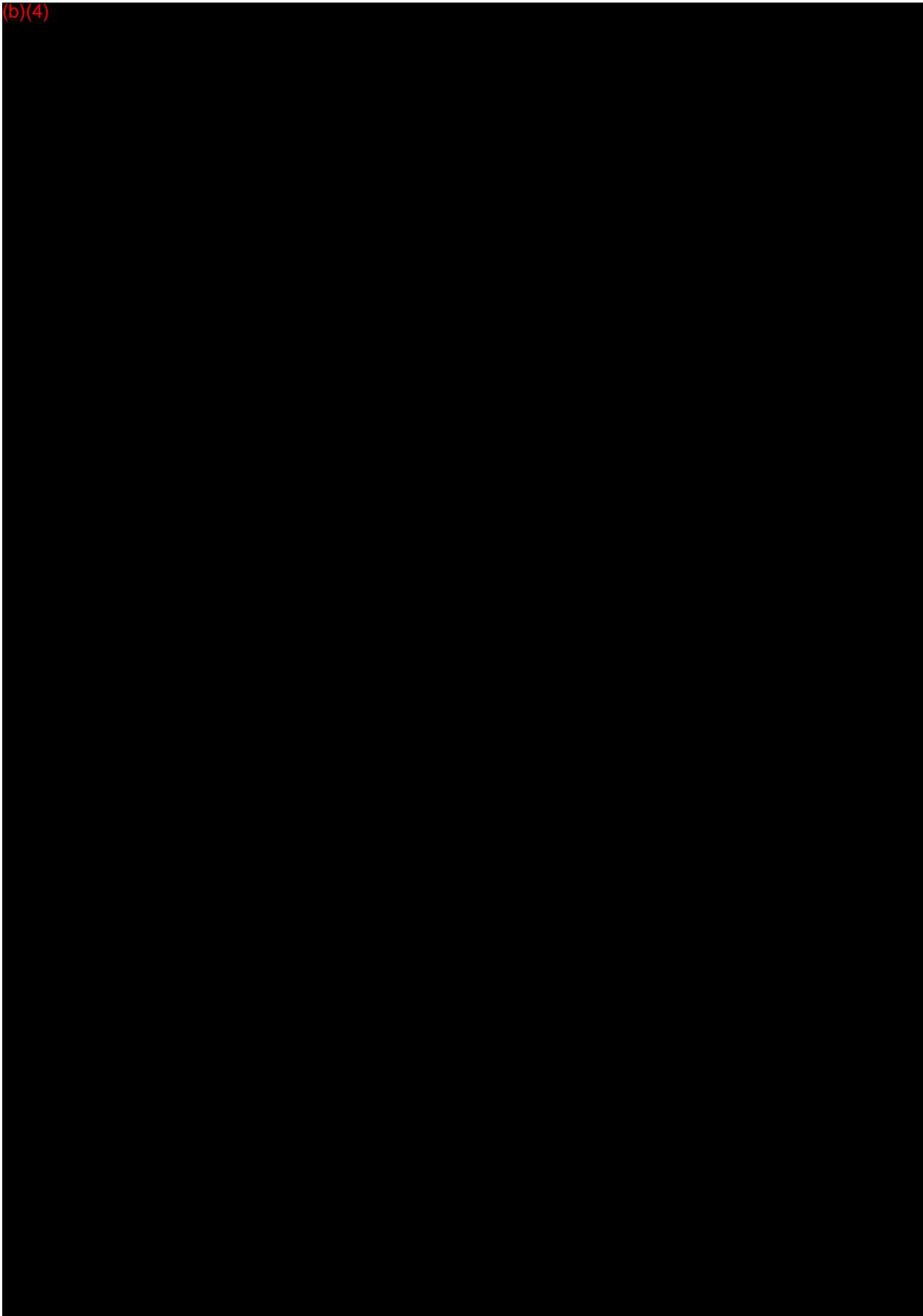
Biocompatibility Test	Pass/Fail
Genotoxicity: In Vitro Chromosomal Aberration Study in Mammalian Cells	Pass
Mouse Bone Marrow Micronucleus Study	Pass
In Vitro Hemolysis Study (Modified ASTM-Direct Contact Method)	Pass
ISO Muscle Implantation Study in the Rabbit	Pass
Cytotoxicity Study using the ISO Elution Method	Pass
ISO Sensitization Study in the Guinea Pig	Pass
ISO Acute Intracutaneous Reactivity Study in the Rabbit	Pass
Chronic Toxicity Study in the Rat following Subcutaneous Implantation (13 weeks)	Pass
Subchronic Intravenous Toxicity Study in the Rat (14 day, saline extract)	Pass
Genotoxicity: Bacterial Reverse Mutation Study	Pass
ISO Acute Systemic Toxicity Study in the Mouse (liquid/chemical)	Pass
ISO Surgical Muscle Implantation in the Rabbit (26 weeks)	Pass

*Table 8.3 Biocompatibility testing summary*

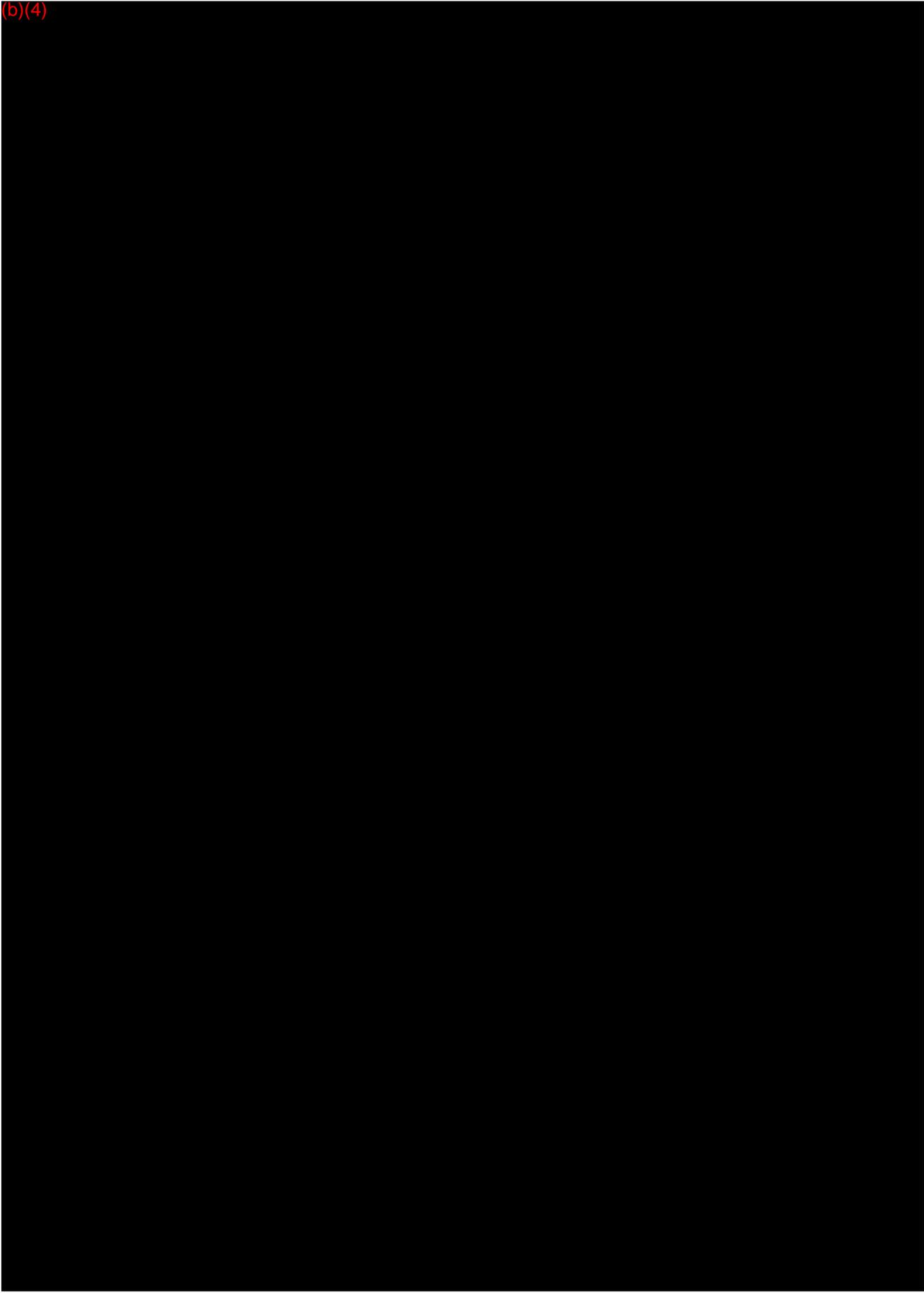




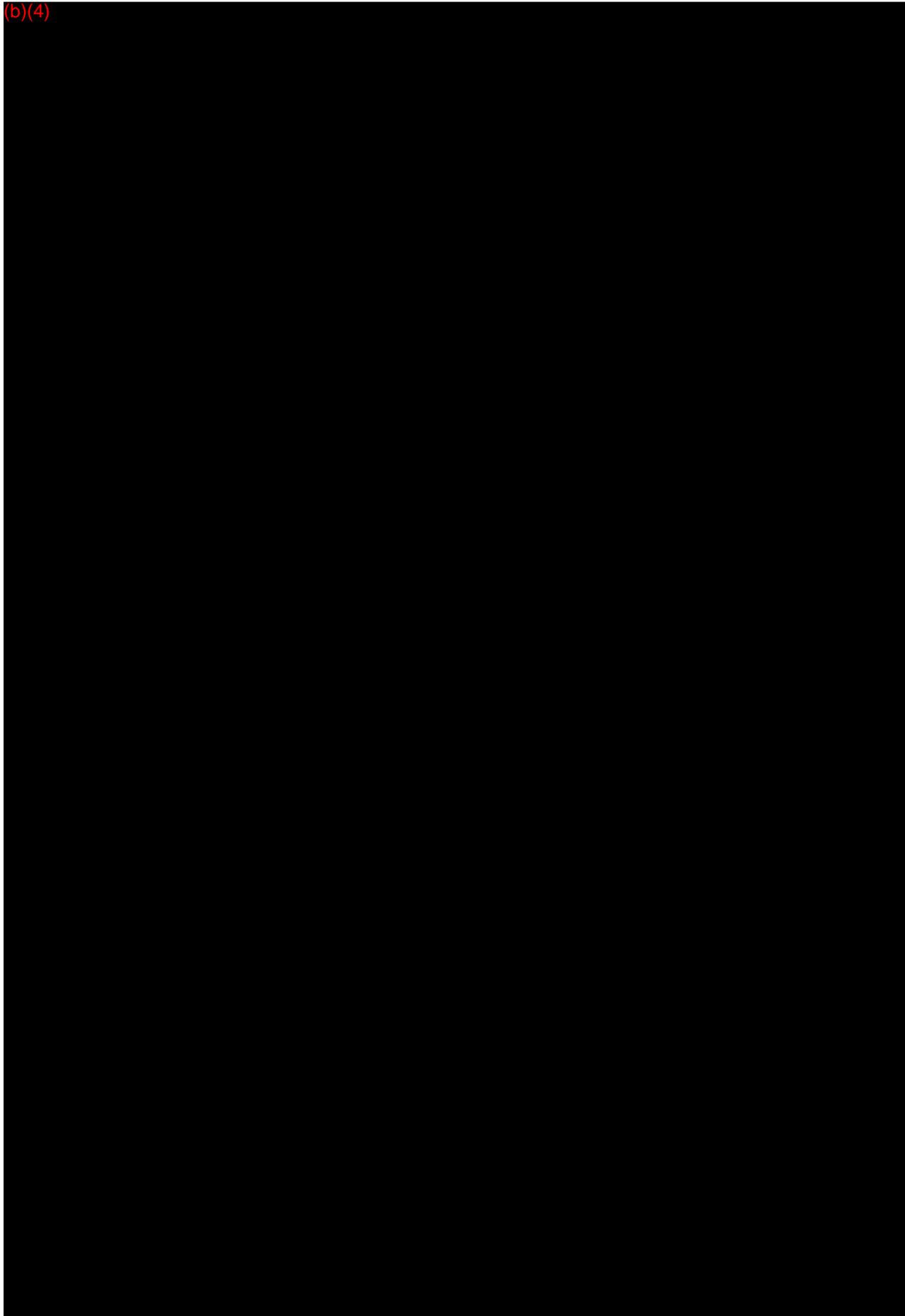
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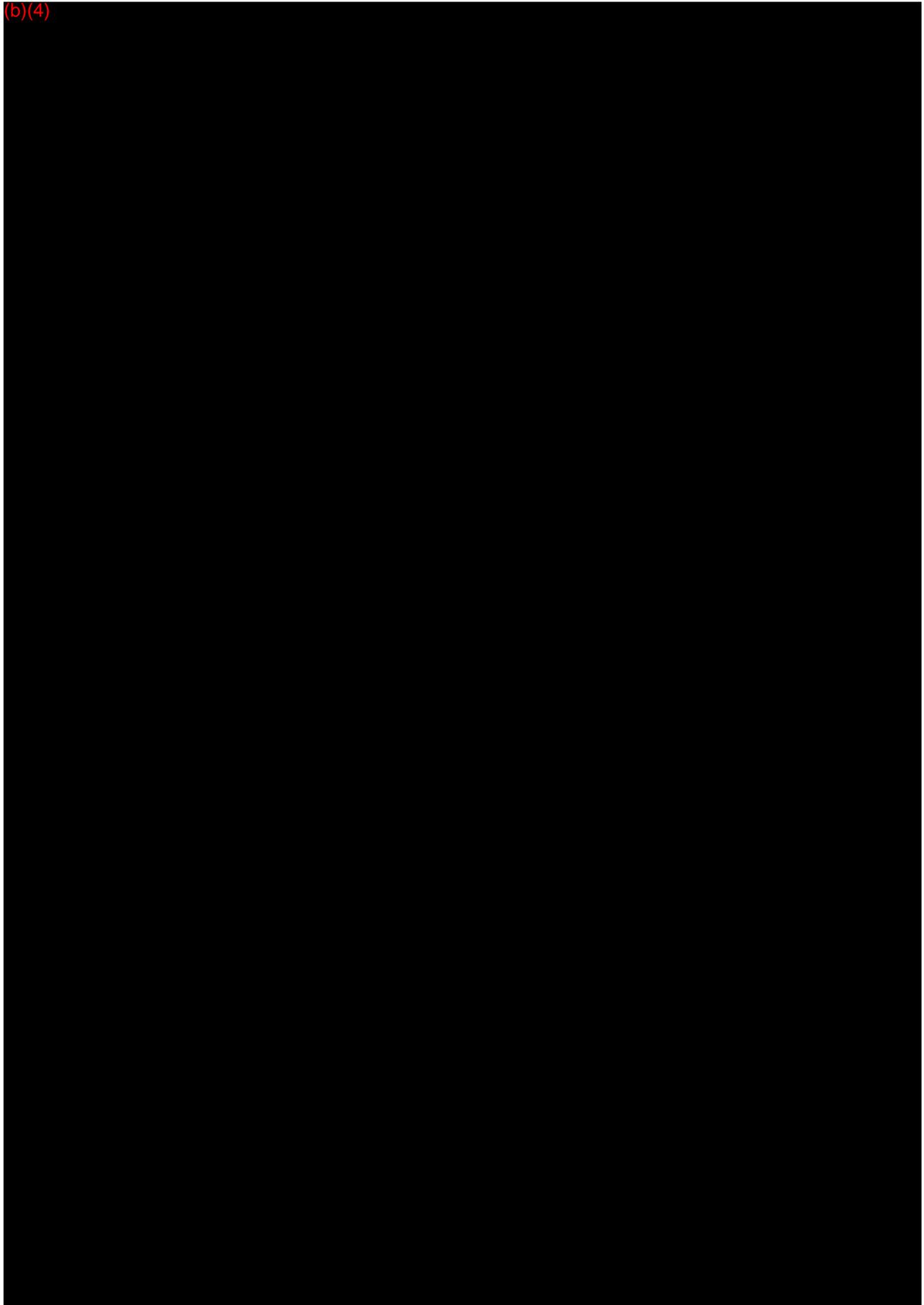
(b)(4)



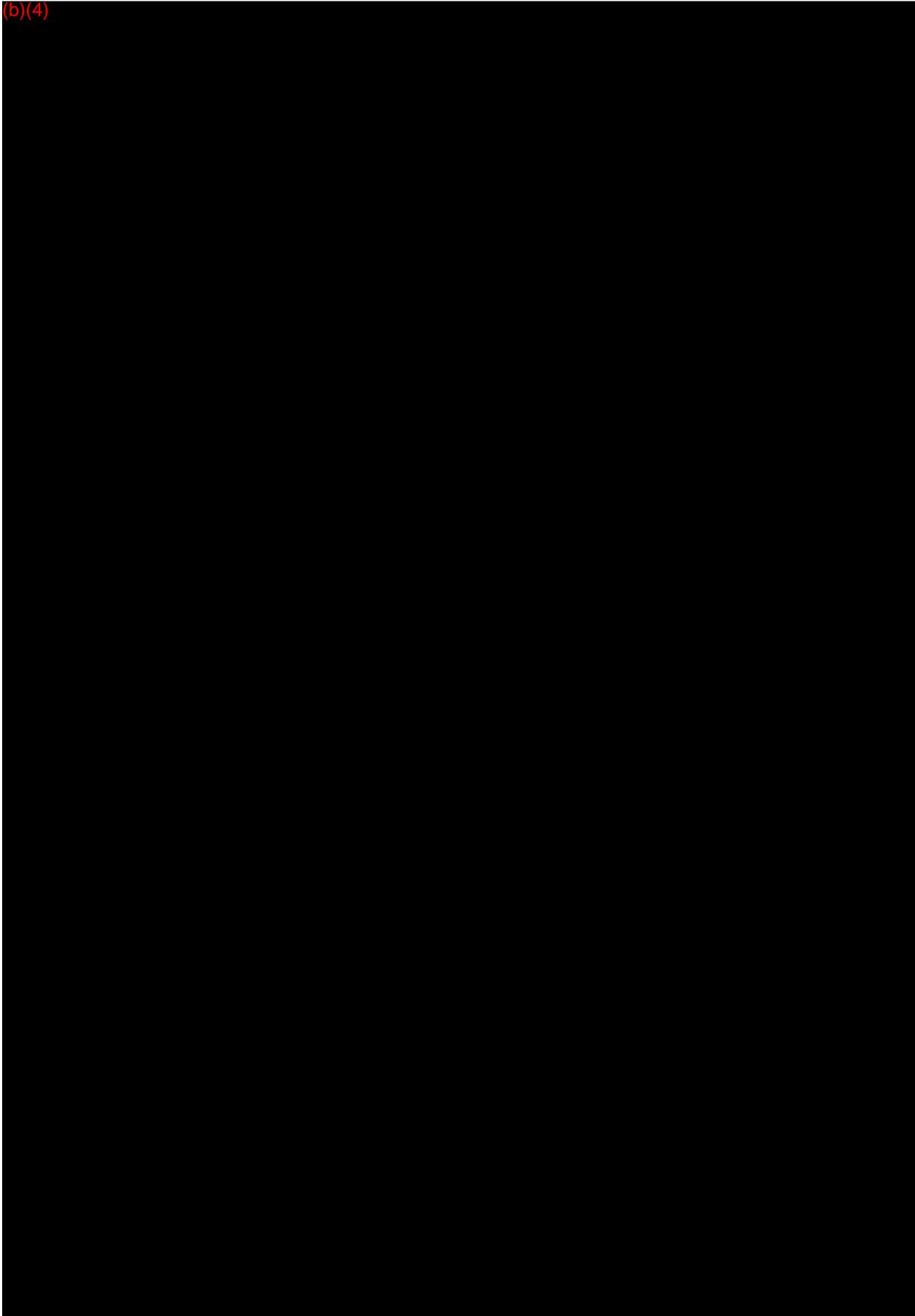




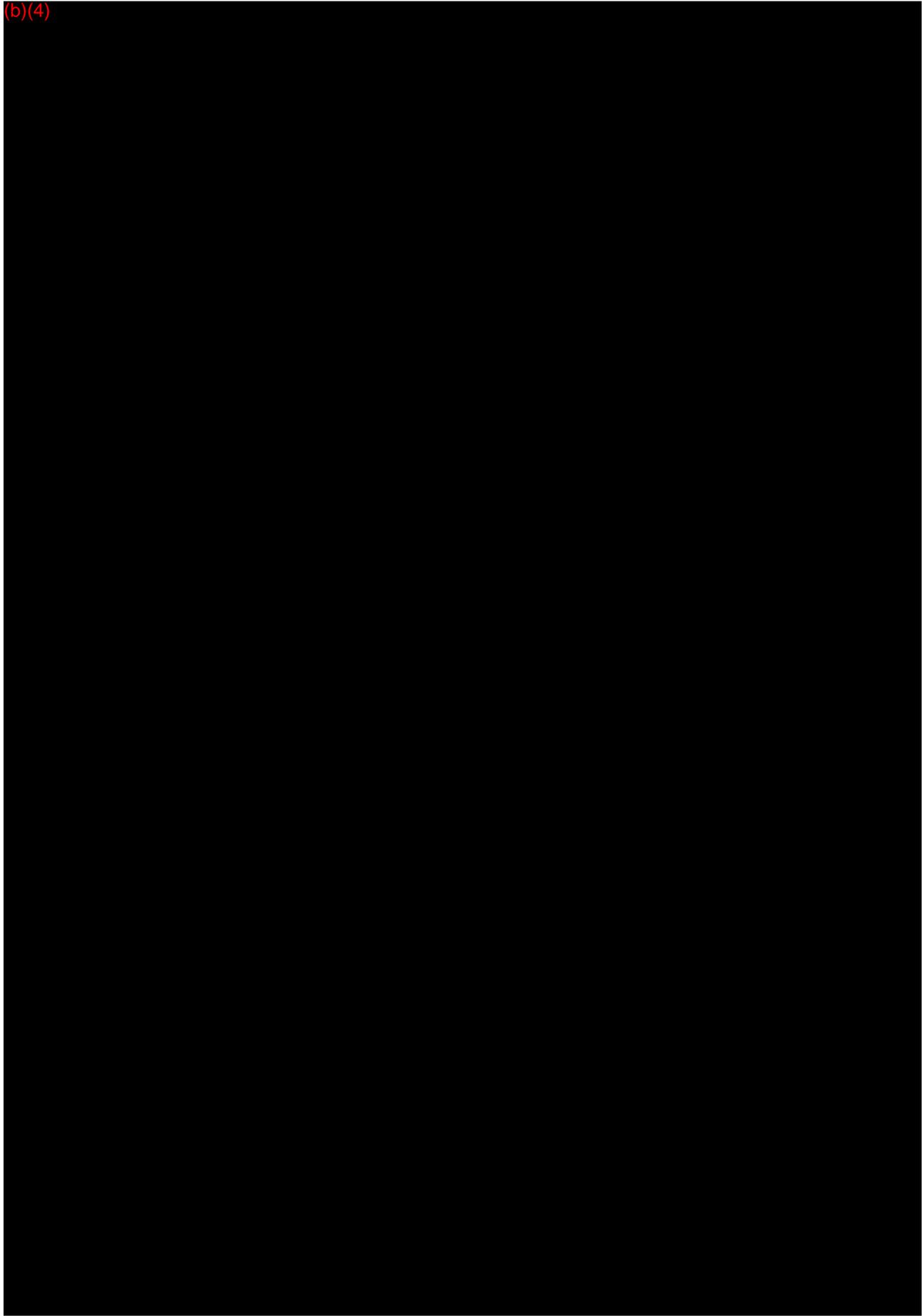
(b)(4)



(b)(4)

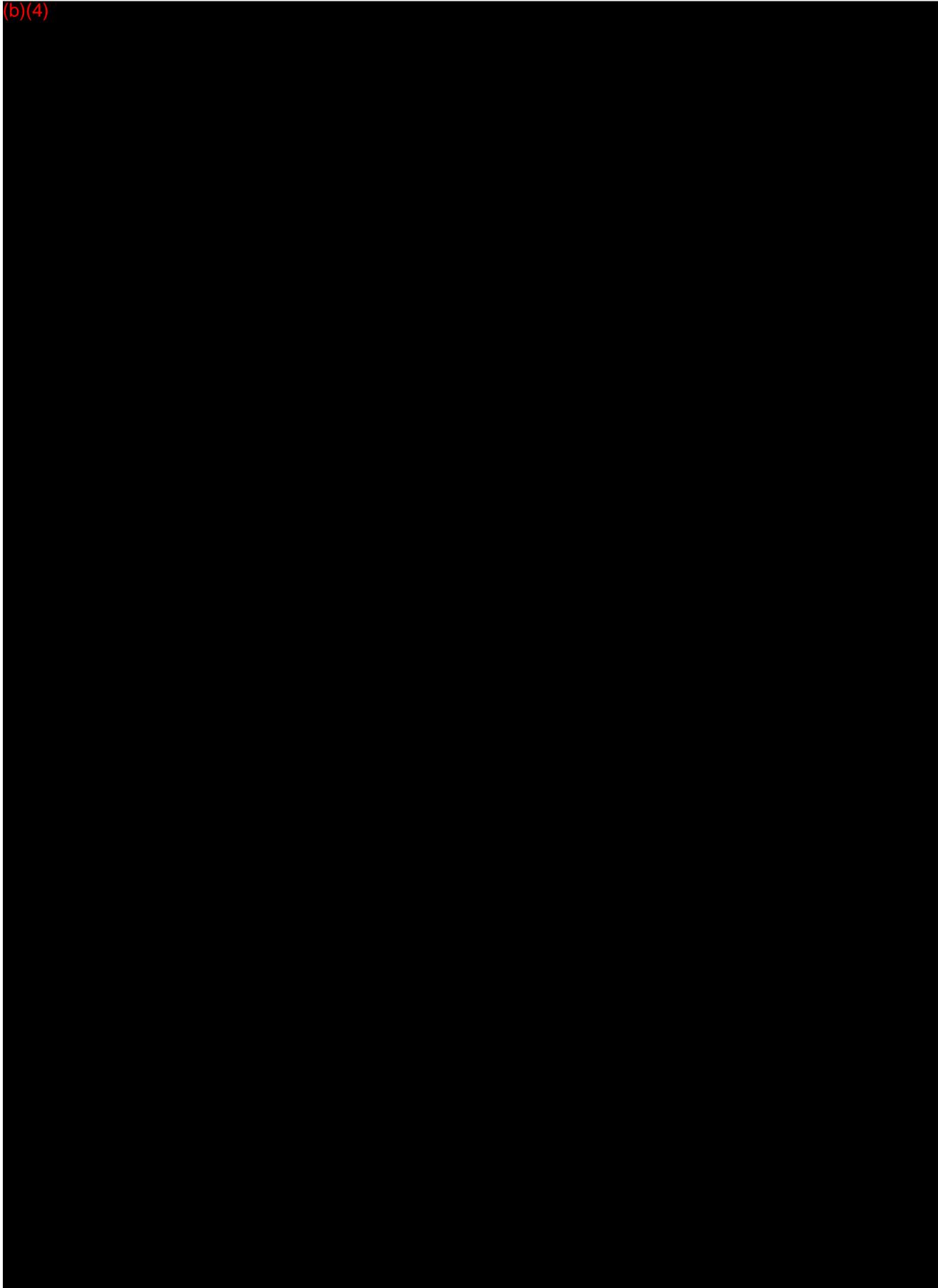


(b)(4)

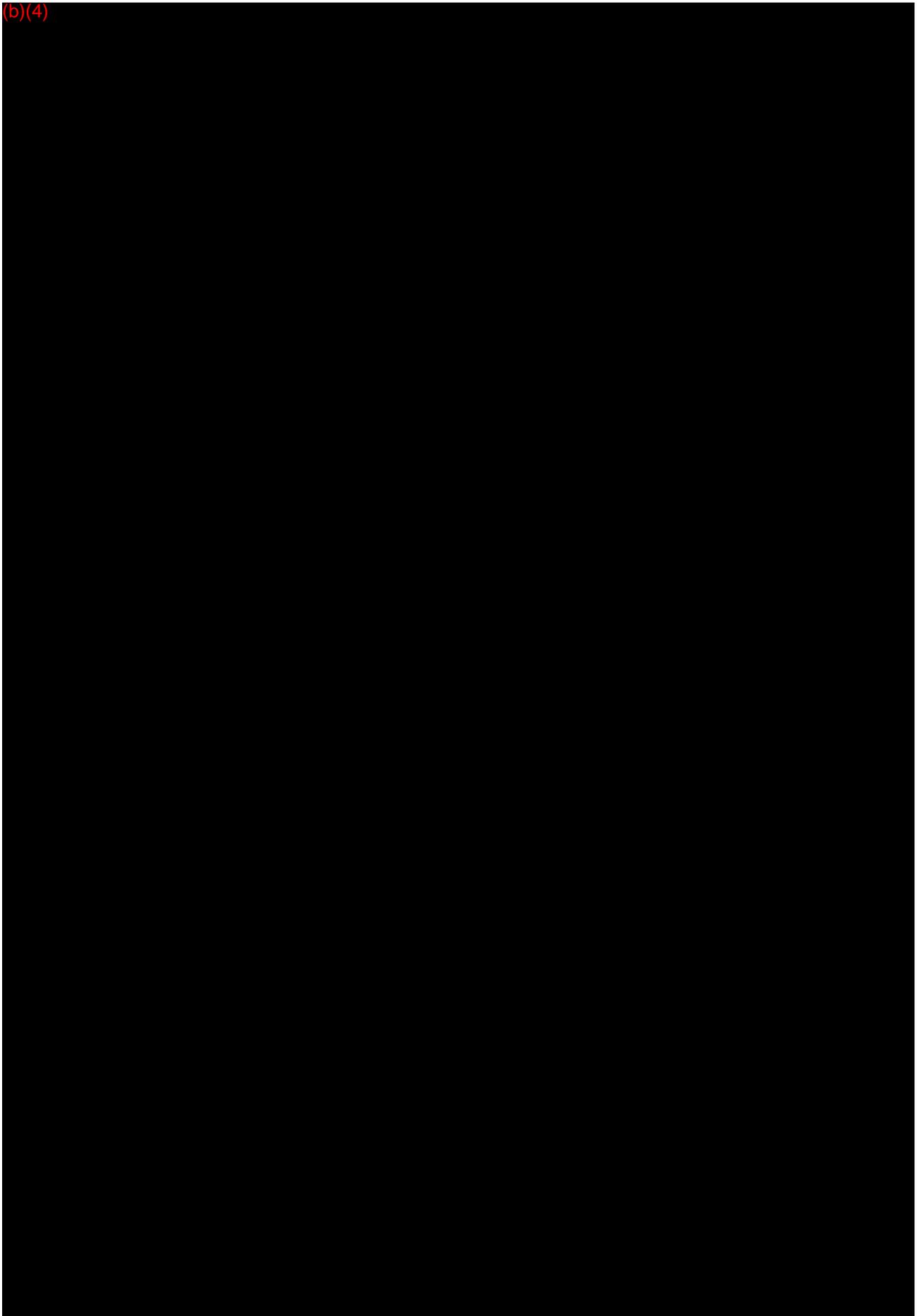




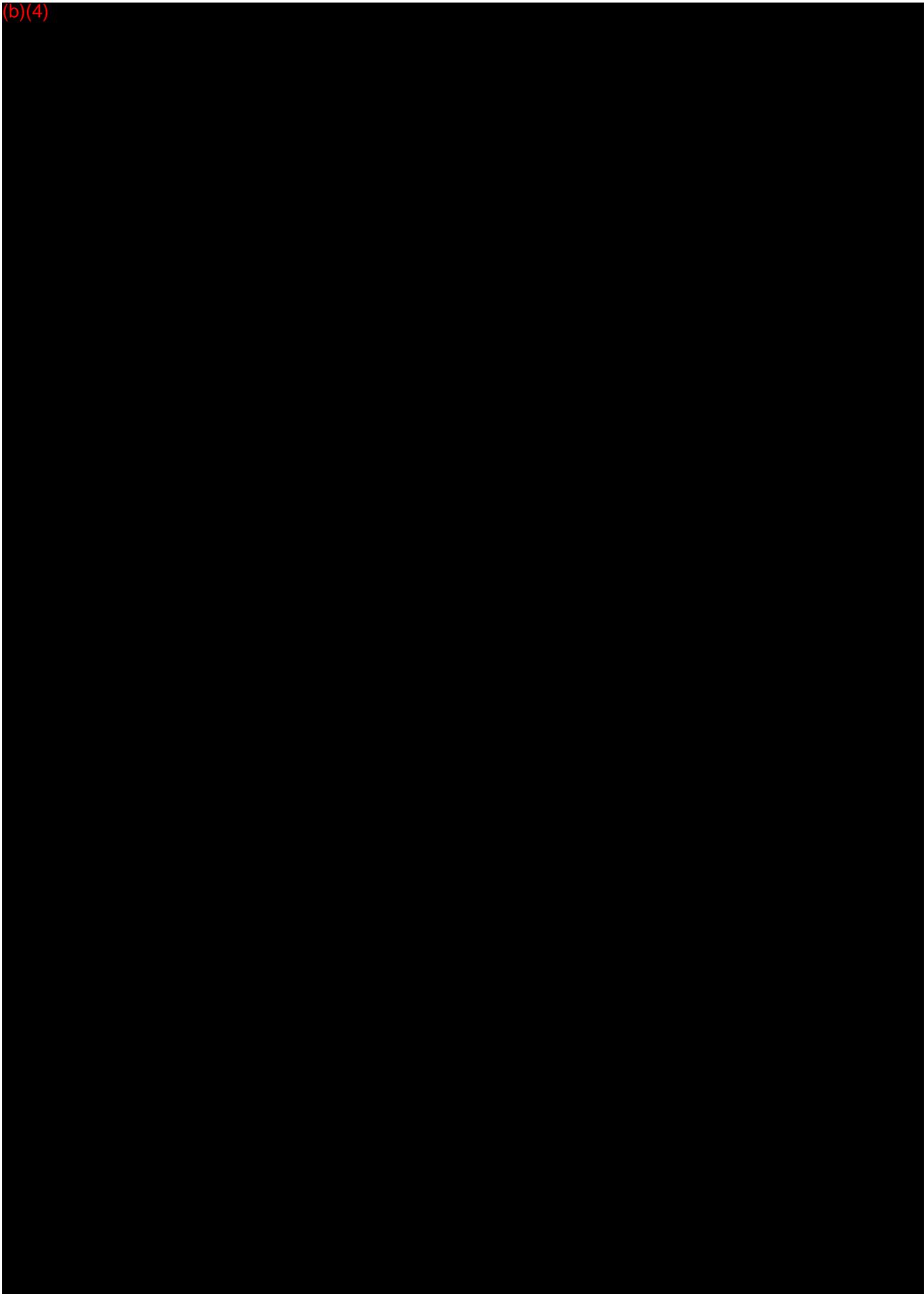
(b)(4)



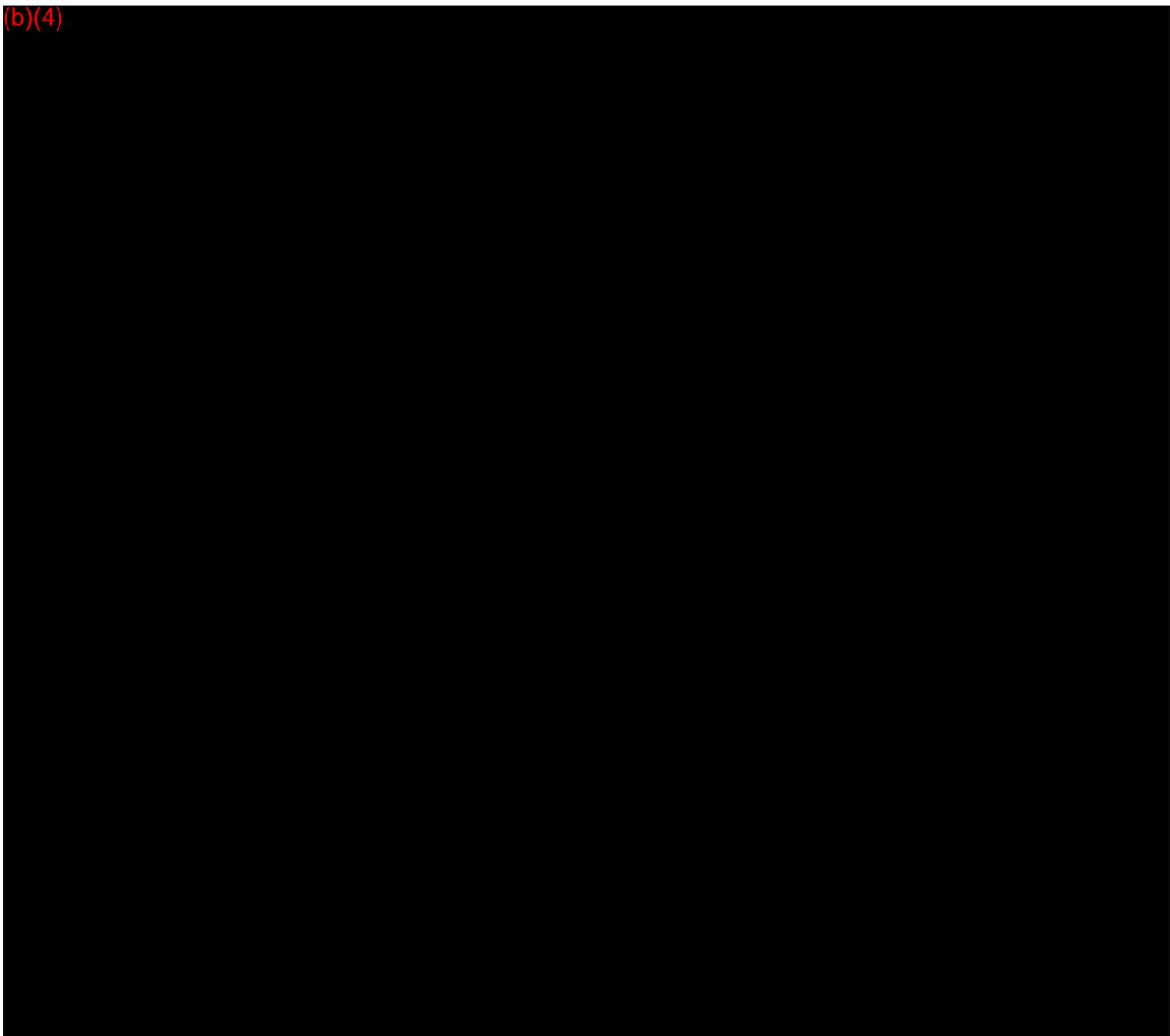
(b)(4)



(b)(4)



(b)(4)



## 9 Appendix I – Standards Certification Forms

### 9.1 ISO 10993-1

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing (now 2003)	
<b>Please answer the following questions</b> <span style="float: right;">Yes    No</span>	
Is this standard recognized by FDA <sup>2</sup> ?	<input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup>	# 2-98
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)?	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device?	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? If yes, report options selected in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ?	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? If yes, was the guidance document followed in preparation of this 510k?	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: <u>Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices May 1, 1</u>	
<sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication] <sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a> <sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a> <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or	certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device. <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a> <sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a>

FORM FDA 3654 (9/07)

Page 1

PSC Graphics (301) 443-1090 EF

<b>EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE</b>		
STANDARD TITLE ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing (now 2003)		
<b>CONFORMANCE WITH STANDARD SECTIONS*</b>		
SECTION NUMBER 6	SECTION TITLE Selection of tests	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * tests were selected from Tables 1 and 2 as appropriate - referring to 10993 Parts-3,4,5,6,10 & 11		
DESCRIPTION ISO 10993-1 is used for the selection of tests based on the device - appropriate tests were identified and selected.		
JUSTIFICATION Per the standard and advice from GLP lab used.		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>* Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<b>Paperwork Reduction Act Statement</b>		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p style="text-align: center;">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p style="text-align: center;"><i>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 control number.</i></p>		

9.2 ISO 10993-3

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> (To be filled in by applicant)	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity..... (now 2003)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes    No <input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# 2-117
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices	
<p><sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]</p> <p><sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a></p> <p><sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or</p>	<p>certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.</p> <p><sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a></p>

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive		
CONFORMANCE WITH STANDARD SECTIONS*		
SECTION NUMBER 4	SECTION TITLE Genotoxicity Testing	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * In Vitro Chromosomal Aberration in Mammalian Cells, Bacterial Reverse Mutation & Mouse Bone Marrow Micronucleus		
DESCRIPTION DNA effects, gene mutations and chromosomal aberrations - three tests - option is additional testing on failures		
JUSTIFICATION All tests were conducted and passed suggesting no further testing required		
SECTION NUMBER 5	SECTION TITLE Carcinogenicity testing	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Not applicable		
DESCRIPTION results of tests in section 4 suggest no additional testing required		
JUSTIFICATION All normal results in genotoxicity testing. raw materials have no know carcinogenicity risks.		
SECTION NUMBER 6	SECTION TITLE Reproductive Toxicity tests	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * None selected		
DESCRIPTION These tests for IUDs, contact with reproductive tissue - the device does not meet the criteria for test in this section		
JUSTIFICATION Not applicable per the standard		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>* Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<p align="center"><b>Paperwork Reduction Act Statement</b></p> <p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p align="center">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p align="center"><i>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 control number.</i></p>		

9.3 ISO 10993-4

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> (To be filled in by applicant)	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood. (now 2002)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes      No <input type="checkbox"/> <input checked="" type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# Not Listed
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices	
<sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication] <sup>2</sup> Authority [21 U.S.C. 360d], www.fda.gov/cdrh/stdsprog.html <sup>3</sup> http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or	certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device. <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm <sup>6</sup> The online search for CDRH Guidance Documents can be found at www.fda.gov/cdrh/guidance.html

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE Biological evaluation of medical devices, Part 4: Selection of tests for interactions with blood		
<b>CONFORMANCE WITH STANDARD SECTIONS*</b>		
SECTION NUMBER 6.3	SECTION TITLE Selection of tests	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Options are 1- 5; Table 5 - Tests for Implant devices was selected		
DESCRIPTION the tables are designed for external contact devices, up to Implant devices		
JUSTIFICATION we selected the most rigorous of the tests in this part, and as per the standard used the table of tests for implant devices.		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>♦ Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<b>Paperwork Reduction Act Statement</b>		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p style="text-align: center;">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p style="text-align: center;"><i>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 control number.</i></p>		

9.4 ISO 10993-5

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>		
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).		
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated		
STANDARD TITLE <sup>1</sup> ISO 10993-5:1999, Biological evaluation of medical devices -- Part 5: Tests for In Vitro cytotoxicity		
<b>Please answer the following questions</b>		
Is this standard recognized by FDA <sup>2</sup> ?	Yes	No
Is this standard recognized by FDA <sup>2</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FDA Recognition number <sup>3</sup>	# 2-64	
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? If no, complete a summary report table.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does this standard include acceptance criteria? If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does this standard include more than one option or selection of tests? If yes, report options selected in the summary report table.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were there any exclusions from the standard? If yes, report these exclusions in the summary report table.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? If yes, was the guidance document followed in preparation of this 510k?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Title of guidance: Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices		
<small> <sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]  <sup>2</sup> Authority [21 U.S.C. 360d], www.fda.gov/cdrh/stdsprog.html  <sup>3</sup> http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm  <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.  <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm  <sup>6</sup> The online search for CDRH Guidance Documents can be found at www.fda.gov/cdrh/guidance.html                 </small>		

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE ISO 10993-5:1999, Biological evaluation of medical devices -- Part 5: Tests for In Vitro cytotoxicity		
CONFORMANCE WITH STANDARD SECTIONS*		
SECTION NUMBER 4.1	SECTION TITLE Sample Preparation -> General	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Extracts only tested on microspheres, solution used as is.		
DESCRIPTION Choice of sample preparation dependant on solid/liquid form		
JUSTIFICATION Solid not possible to test directly		
SECTION NUMBER 4.2.2	SECTION TITLE Extraction Vehicle	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Culture medium with serum		
DESCRIPTION 4.2.2 a) Culture Medium with serum		
JUSTIFICATION Simulates physiological conditions, most preferable conditions (NAMSA)		
SECTION NUMBER 4.2.3	SECTION TITLE Extraction Conditions	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * 24 hrs and (37 ± 2)°C chosen		
DESCRIPTION Most relevant to test item and placement in body		
JUSTIFICATION Simulates physiological conditions, most preferable conditions (NAMSA). Extract serum cannot be used above 37°C (NAMSA)		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>♦ Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
Paperwork Reduction Act Statement		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p style="text-align: center;">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p style="text-align: center;"><i>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 control number.</i></p>		

9.5 ISO 10993-6

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation. (now 2007)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes    No <input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# 2-120 (2007)
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices	
<sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication] <sup>2</sup> Authority [21 U.S.C. 360d], www.fda.gov/cdrh/stdsprog.html <sup>3</sup> http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or	certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device. <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm <sup>6</sup> The online search for CDRH Guidance Documents can be found at www.fda.gov/cdrh/guidance.html



9.6 ISO 10993-10

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization. (updated 2002)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# 2-87 (2002)
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: <u>Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices</u>	
<p><sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]</p> <p><sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a></p> <p><sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or</p>	<p>certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.</p> <p><sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a></p>

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PSC Graphics (301) 443-1090 EF

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization. (updated 2002)		
CONFORMANCE WITH STANDARD SECTIONS*		
SECTION NUMBER 6.4	SECTION TITLE Human Skin Irritation test	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Not carried out on human subjects		
DESCRIPTION Human exposure		
JUSTIFICATION Human exposure considered to be very low due to device nature.		
SECTION NUMBER 7	SECTION TITLE Delayed Hypersensitivity Tests	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Not carried out		
DESCRIPTION Single chemical skin sensitization potential		
JUSTIFICATION Implanted device, adverse effects evaluated through subcutaneous and long term implantations.		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>* Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<b>Paperwork Reduction Act Statement</b>  Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:  Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850  <i>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 control number.</i>		

9.7 ISO 10993-11

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity (updated 2006)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes    No <input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# 2-18 (2006)
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: <u>Required Biocompatibility Training and Toxicology Profiles for Evaluation of Medical Devices</u>	
<p><sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]</p> <p><sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a></p> <p><sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or</p>	<p>certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.</p> <p><sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a></p>

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity (updated 2006)		
CONFORMANCE WITH STANDARD SECTIONS*		
SECTION NUMBER 4.2	SECTION TITLE Selection of Animal Species	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Rat and Mouse models chosen		
DESCRIPTION Choice of animals		
JUSTIFICATION Mouse and Rat preferred species for IV/IP (NAMSA and Standard)		
SECTION NUMBER 4.5.1	SECTION TITLE Size of Groups	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Subchronic Rat: 10 of each sex. Acute Mouse: 5 IP & 5 IV routes single sex		
DESCRIPTION Choice of numbers and sex		
JUSTIFICATION As per standard Table 1		
SECTION NUMBER 6	SECTION TITLE Repeated Exposure	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED * Not Carried out		
DESCRIPTION Repeated dose studies		
JUSTIFICATION 13 week chronic toxicity carried out following subcutaneous implanation as device is an implant.		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>♦ Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<b>Paperwork Reduction Act Statement</b>  Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:  Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850  <i>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 control number.</i>		

9.8 ISO 11607

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> SO 11607-1:2003, Packaging for terminally sterilized medical devices (updated 2006)	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes    No <input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup> .....	# 14-193
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Title of guidance: <u>Premarket notification [510(k)] submissions for medical sterilization packaging systems in health care fac</u>	
<p><sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]</p> <p><sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a></p> <p><sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or</p>	<p>certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.</p> <p><sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a></p>

**9.9 ISO 17665**

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>		
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).		
TYPE OF 510(K) SUBMISSION <input type="checkbox"/> Traditional <input checked="" type="checkbox"/> Special <input type="checkbox"/> Abbreviated		
STANDARD TITLE <sup>1</sup> ISO 17665-1:2006 Sterilization of health care products - Moist heat - Part 1; Requirements for the development, validation etc		
<b>Please answer the following questions</b>		
Is this standard recognized by FDA <sup>2</sup> ? .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
FDA Recognition number <sup>3</sup> .....	# 14-261	
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Title of guidance: _____		
<sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication] <sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a> <sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a> <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or	certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device. <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a> <sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a>	

FORM FDA 3654 (9/07)

Page 1

PSC Graphics (301) 443-1090 EF

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE ISO 17655-1 Sterilization of health care products - Moist heat - Part 1: Requirements for the development, validation etc		
CONFORMANCE WITH STANDARD SECTIONS*		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
Full validation		
DESCRIPTION Full validation		
JUSTIFICATION Report on file at Biocompatibles		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>* Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
Paperwork Reduction Act Statement		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p style="text-align: center;">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p style="text-align: center;"><i>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 control number.</i></p>		

9.10 ISO 14937

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>	
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).	
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated	
STANDARD TITLE <sup>1</sup> AAMI / ANSI / ISO 14937:2000, Sterilization of Health Care Products - General Requirements for Characterization of a Sterilizin	
<b>Please answer the following questions</b>	
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes    No <input checked="" type="checkbox"/> <input type="checkbox"/>
FDA Recognition number <sup>3</sup> ..... # 14-88	
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input checked="" type="checkbox"/> <input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/> <input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Title of guidance: _____	
<p><sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]</p> <p><sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a></p> <p><sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or</p>	<p>certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.</p> <p><sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a></p> <p><sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a></p>

FORM FDA 3654 (9/07)

Page 1

PSC Graphics (301) 443-1090 EF

9.11 ISO 14971

Form Approved: OMB No. 0910-0120; Expiration Date: 8/31/10

Department of Health and Human Services Food and Drug Administration <b>STANDARDS DATA REPORT FOR 510(k)s</b> <i>(To be filled in by applicant)</i>		
This report and the Summary Report Table are to be completed by the applicant when submitting a 510(k) that references a national or international standard. A separate report is required for each standard referenced in the 510(k).		
TYPE OF 510(K) SUBMISSION <input checked="" type="checkbox"/> Traditional <input type="checkbox"/> Special <input type="checkbox"/> Abbreviated		
STANDARD TITLE <sup>1</sup> ISO 14971 Medical devices - Application of risk management to medical devices. (Updated 2007)		
<b>Please answer the following questions</b>		
Is this standard recognized by FDA <sup>2</sup> ? .....	Yes	No
FDA Recognition number <sup>3</sup> .....	# 5-40	
Was a third party laboratory responsible for testing conformity of the device to this standard identified in the 510(k)? .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is a summary report <sup>4</sup> describing the extent of conformance of the standard used included in the 510(k)? ..... If no, complete a summary report table.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does the test data for this device demonstrate conformity to the requirements of this standard as it pertains to this device? .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does this standard include acceptance criteria? ..... If no, include the results of testing in the 510(k).	<input type="checkbox"/>	<input type="checkbox"/>
Does this standard include more than one option or selection of tests? ..... If yes, report options selected in the summary report table.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were there any deviations or adaptations made in the use of the standard? ..... If yes, were deviations in accordance with the FDA supplemental information sheet (SIS) <sup>5</sup> ? .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were deviations or adaptations made beyond what is specified in the FDA SIS? ..... If yes, report these deviations or adaptations in the summary report table.	<input type="checkbox"/>	<input type="checkbox"/>
Were there any exclusions from the standard? ..... If yes, report these exclusions in the summary report table.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there an FDA guidance <sup>6</sup> that is associated with this standard? ..... If yes, was the guidance document followed in preparation of this 510k? .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Title of guidance: _____		
<small> <sup>1</sup> The formatting convention for the title is: [SDO] [numeric identifier] [title of standard] [date of publication]  <sup>2</sup> Authority [21 U.S.C. 360d], <a href="http://www.fda.gov/cdrh/stdsprog.html">www.fda.gov/cdrh/stdsprog.html</a>  <sup>3</sup> <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a>  <sup>4</sup> The summary report should include: any adaptations used to adapt to the device under review (for example, alternative test methods); choices made when options or a selection of methods are described; deviations from the standard; requirements not applicable to the device; and the name and address of the test laboratory or certification body involved in conformance assessment to this standard. The summary report includes information on all standards utilized during the development of the device.  <sup>5</sup> The supplemental information sheet (SIS) is additional information which is necessary before FDA recognizes the standard. Found at <a href="http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm">http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfStandards/search.cfm</a>  <sup>6</sup> The online search for CDRH Guidance Documents can be found at <a href="http://www.fda.gov/cdrh/guidance.html">www.fda.gov/cdrh/guidance.html</a> </small>		

EXTENT OF STANDARD CONFORMANCE SUMMARY REPORT TABLE		
STANDARD TITLE		
<b>CONFORMANCE WITH STANDARD SECTIONS*</b>		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
SECTION NUMBER	SECTION TITLE	CONFORMANCE? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
TYPE OF DEVIATION OR OPTION SELECTED *		
DESCRIPTION		
JUSTIFICATION		
<p>* For completeness list all sections of the standard and indicate whether conformance is met. If a section is not applicable (N/A) an explanation is needed under "justification." Some standards include options, so similar to deviations, the option chosen needs to be described and adequately justified as appropriate for the subject device. Explanation of all deviations or description of options selected when following a standard is required under "type of deviation or option selected," "description" and "justification" on the report. More than one page may be necessary.</p> <p>* Types of deviations can include an exclusion of a section in the standard, a deviation brought out by the FDA supplemental information sheet (SIS), a deviation to adapt the standard to the device, or any adaptation of a section.</p>		
<b>Paperwork Reduction Act Statement</b>		
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to:</p> <p style="text-align: center;">Center for Devices and Radiological Health 1350 Piccard Drive Rockville, MD 20850</p> <p style="text-align: center;"><i>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 control number.</i></p>		

## 10 Appendix II – 70-150µm LC Bead Product Specification



























## 12 Appendix IV Instruction For Use (IFU)

# English

## LC Bead™ Embolic Agent

### INSTRUCTIONS FOR USE

STERILE  
SINGLE USE ONLY  
NON-PYROGENIC

Sterilized by steam  
*Do not use if the package is opened or damaged*

#### DESCRIPTION:

LC Bead are hydrogel microspheres that are biocompatible, hydrophilic, nonresorbable and precisely calibrated. LC Bead are produced from polyvinyl alcohol and available in the following size :

Size	Label Color
70 – 150 µm	Turquoise

#### PRESENTATION:

- Glass vial of 10ml
- Stopper sealed by an aluminum cap equipped with a colored cap
- Each vial contains approximately 2 ml of LC Bead in a non-pyrogenic sterile physiological buffered saline.
- Each vial is intended for single patient use only. Do not resterilize. Discard any unused material

#### INDICATIONS:

LC Bead are intended to be used for the embolization of hypervascular tumors and arteriovenous malformations (AVMs).

#### CLINICAL APPLICATIONS:

The scientific literature provides extensive documentation of embolization procedures using a wide variety of artificial agents in both neurological and peripheral vascular systems, including the head, neck, spine, liver, genitourinary tract, uterus, gastrointestinal system, limbs and lungs. A representative bibliography is provided following these instructions for use.

#### CONTRAINDICATIONS:

1. Patients intolerant to occlusion procedures.
2. Vascular anatomy or blood flow that precludes catheter placement or emboli injection.
3. Presence or likely onset of vasospasm.
4. Presence or likely on set of hemorrhage.
5. Presence of severe atheromatous disease.
6. Presence of feeding arteries smaller than distal branches from which they emerge.
7. Presence of patent extra-to-intracranial anastomoses or shunts.
8. Presence of collateral vessel pathways potentially endangering normal territories during embolization.
9. Presence of end arteries leading directly to cranial nerves.
10. Presence of arteries supplying the lesion not large enough to accept LC Bead.
11. Vascular resistance peripheral to the feeding arteries precluding passage of LC Bead into the lesion.
12. Do not use LC Bead in the following applications:
  - i. Embolization of large diameter arteriovenous shunts (ie. where the blood does not pass through the arterial/capillary/venous transition but directly from artery to vein.
  - ii. The pulmonary arterial vasculature.
  - iii. Any vasculature where LC Bead Embolic Agent could pass directly into the internal carotid artery or other non-target territories

**WARNING: Studies have shown that LC Bead do not form**

aggregates and, as a result, penetrate deeper into the vasculature as compared to similarly sized PVA particles. Care must be taken to choose a larger sized LC Bead Embolic Agent when embolizing arteriovenous malformations with large shunts to avoid passage of the microspheres into the pulmonary or coronary circulation.

The color of the LC Bead could be visible through the skin if injected into arteries feeding superficial tissues.

#### CAUTIONS:

- Do not use if the vial or packaging appear damaged.
- Sterile and single use product. Do not reuse.
- Select the size and quantity of LC Bead appropriate for the pathology to be treated.
- Ensure that LC Bead is an appropriate size for the intended vasculature.
- Monitor patients carefully for signs of non-target embolization such as hypoxia or CNS changes.
- Consider upsizing LC Bead if angiographic evidence of embolization does not appear quickly during delivery.
- Embolization with LC Bead should only be performed by physicians who have received appropriate interventional occlusion training in the region intended to be embolized.

**CAUTION:**  
Federal (USA) law restricts this device to sale by or on order of a physician.

#### POTENTIAL COMPLICATIONS:

1. Undesirable reflux or passage of LC Bead into normal arteries adjacent to the targeted lesion or through the lesion into other arteries or arterial beds, such as the internal carotid artery, pulmonary, or coronary circulations.
2. Non-target embolization
3. Pulmonary embolization.
4. Ischemia at an undesirable location.
5. Capillary bed saturation and tissue damage.
6. Ischemic stroke or Ischemic infarction.
7. Vessel or lesion rupture and hemorrhage.
8. Neurological deficits including cranial nerve palsies.
9. Vasospasm.
10. Death.
11. Recanalization.
12. Foreign body reactions necessitating medical intervention.
13. Infection necessitating medical intervention.
14. Clot formation at the tip of the catheter and subsequent dislodgement.

#### CONSERVATION AND STORAGE:

- LC Bead must be stored in a cool, dry and dark place in its original packaging.
- Use by the date indicated on the vial label.
- Do not freeze.

#### INSTRUCTIONS FOR USE:

- Carefully evaluate the vascular network associated with the lesion using high resolution imaging prior to beginning the embolization procedure.
- LC Bead are available in a range of sizes. Care should be taken to choose the appropriate size LC Bead that best matches the pathology (ie. vascular target/vessel size) and provides the desired clinical outcome.
- When embolising arteriovenous malformations, choose a particle size that will occlude the nidus without passing through the AVM.
- Choose a delivery catheter based on the size of the target vessel. LC Bead can tolerate temporary compression of 20% to 30% in order to facilitate passage through the delivery catheter.
- Introduce the delivery catheter into the target vessel according to standard techniques. Position the catheter tip as close as possible to the treatment site to avoid inadvertent occlusion of normal vessels.

- LC Bead are not radio-opaque. It is recommended to monitor the embolization under fluoroscopic visualization by adding the desired amount of contrast medium to the suspension fluid.

To deliver LC Bead.

- After shaking the vial containing the LC Bead, dilute the product with contrast medium either in a metallic/stainless steel cup or directly in the vial.
  - i. Take care to ensure proper suspension of the microspheres in the contrast medium to enhance distribution during injection.
  - ii. Draw the LC Bead into a syringe needle of a size greater than or equal to 19 gauge (1.07 mm).
  - iii. Slowly inject LC Bead into the delivery catheter under fluoroscopic visualization while observing the contrast flow rate. If there is no effect on the flow rate, choose a larger microsphere size and repeat the delivery process. Exercise conservative judgment in determining the embolization endpoint.
- Upon completion of the treatment, remove the catheter while maintaining gentle suction so as not to dislodge LC Bead still within the catheter lumen.
- Discard any open, unused LC Bead.

6. Clouse ME: Hepatic artery embolization for bleeding and tumours. *Surg Clin N Am*, 69(2): 419-432, Apr 1989.
7. Derdyn C, Graves, V, Salamat M, Rappe A: Collagen-coated acrylic microspheres for embolotherapy: In vivo and in vitro characteristics. *AJNR*, 18:647-653, April 1997.
8. Deveikis JP: endovascular therapy of intracranial arteriovenous malformations: materials and techniques. *Neuroimaging Clin of N Am*, 8(2):401-424, 1998.
9. Encarcacion CE, Kadir S, Beam CA, Payne CS: Gastrointestinal bleeding: Treatment with gastrointestinal arterial embolization. *Radiol*, 183(2):505-508, May 1992.
10. Frizzel RT, Fisher WS: Cure, morbidity and mortality associated with embolization of brain arteriovenous malformations: A review of 1246 patients in 32 series over a 35-year period. *Neurosurg*, 37(6): 1031-1040, Dec 1995.
11. Laurent A, Beaujeux R, Wassef M, et al: Trisacryl gelatin microspheres for therapeutic embolization, I: Development and in vitro evaluation. *AJNR* < 17:533-540, March 1996.
12. Rose SC: Transcatheter occlusion of injured extremity and pelvic arteries. In: *Peripheral Vascular Intervention*.
13. Bendszus M, Klein R, Burger R, et al: Efficacy of trisacryl gelatin microspheres versus polyvinyl alcohol particles in the preoperative embolization of meningiomas. *AJNR*, 21(2):255-261, Feb 2000.

**PACKAGE LABEL:**

<b>REF</b>	Catalogue number
	Batch number/Lot number
	Do not reuse
	Attention see instructions for use
	Steam Sterilized
	Use before/Expiry
	Protect from light
	Protect from moisture
0°C 	Do not freeze

**Patents**

US 5,583,163  
 US 6,652,883  
 US 6,676,971  
 Other patents pending

Manufactured by:  
**Biocompatibles UK Limited**  
 Chapman House  
 Farnham Business Park  
 Weydon Lane  
 Farnham  
 Surrey GU9 8QL  
 United Kingdom

Tel: +44 (0)1252 732 732  
 Fax: +44 (0)1252 732 777  
<http://www.biocompatibles.com>

**REFERENCES:**

1. Ahuja A, Gibbons K: Endovascular therapy of central nervous system tumours. *Neurosurg Clin of N Am*, 5(3): 541-554, 1994.
2. Ajani JA, Carrasco CH, Wallace S: Neuroendocrine tumours metastatic to the liver: Vascular occlusion therapy. *Ann NY Acad Sci*, 733: 479-487, Sep 1994.
3. Beaujeux R, Laurent A, Wassef M et al: Trisacryl gelatin microspheres for therapeutic embolization, II: Preliminary clinical evaluation in tumours and arteriovenous malformations. *AJNR*, 17: 541-548, March 1996.
4. Bendszus M, Klein R, burger R, et al: Efficacy of trisacryl gelatin microspheres and polyvinylalcohol (PVA) particles in the preoperative embolization of meningiomas. Presented at the ASNR 36<sup>th</sup> Annual Meeting, May 17-21, 1998.
5. Charnsangavej C, Wallace S: Transcatheter regional therapy of extremity tumours. In: *Peripheral Vascular Intervention*.

## 13 Appendix V Device Master Record (DMR)

















































**COVER SHEET MEMORANDUM**

From: Reviewer Name JEFFREY TOI  
 Subject: 510(k) Number K094018/S1  
 To: The Record

Please list CTS decision code SE

- Refused to accept (Note: this is considered the first review cycle, See Screening Checklist [http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0\\_5631/Screening%20Checklist%207%202%2007.doc](http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_5631/Screening%20Checklist%207%202%2007.doc))
- Hold (Additional Information or Telephone Hold).
- Final Decision (SE, SE with Limitations, NSE, Withdrawn, etc.).

Please complete the following for a final clearance decision (i.e., SE, SE with Limitations, etc.):		YES	NO
Indications for Use Page	Attach IFU	✓	
510(k) Summary /510(k) Statement	Attach Summary	✓	
Truthful and Accurate Statement.	Must be present for a Final Decision	✓	
Is the device Class III?			✓
If yes, does firm include Class III Summary?	Must be present for a Final Decision		✓
Does firm reference standards? (If yes, please attach form from <a href="http://www.fda.gov/opacom/morechoices/fdaforms/FDA-3654.pdf">http://www.fda.gov/opacom/morechoices/fdaforms/FDA-3654.pdf</a> )		✓	
Is this a combination product? (Please specify category <u>N</u> , see <a href="http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_413b/COMBINATION%20PRODUCT%20ALGORITHM%20(REVISED%203-12-03).DOC">http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_413b/COMBINATION%20PRODUCT%20ALGORITHM%20(REVISED%203-12-03).DOC</a> )			✓
Is this a reprocessed single use device? (Guidance for Industry and FDA Staff – MDUFMA - Validation Data in 510(k)s for Reprocessed Single-Use Medical Devices, <a href="http://www.fda.gov/cdrh/ode/guidance/1216.html">http://www.fda.gov/cdrh/ode/guidance/1216.html</a> )			✓
Is this device intended for pediatric use only?			✓
Is this a prescription device? (If both prescription & OTC, check both boxes.)		✓	
Did the application include a completed FORM FDA 3674, Certification with Requirements of ClinicalTrials.gov Data Bank?		✓	
Is clinical data necessary to support the review of this 510(k)? Did the application include a completed FORM FDA 3674, Certification with Requirements of ClinicalTrials.gov Data Bank? (If not, then applicant must be contacted to obtain completed form.)			✓
Does this device include an Animal Tissue Source?			✓
All Pediatric Patients age<=21		✓	
Neonate/Newborn (Birth to 28 days)			
Infant (29 days -< 2 years old)			
Child (2 years -< 12 years old)			
Adolescent (12 years -< 18 years old)			
Transitional Adolescent A (18 - <21 years old) Special considerations are being given to this group, different from adults age ≥ 21 (different device design or testing, different protocol procedures, etc.)			

4

Transitional Adolescent B (18 -<= 21; No special considerations compared to adults => 21 years old)

Nanotechnology

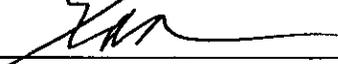
Is this device subject to the Tracking Regulation? (Medical Device Tracking Guidance, <http://www.fda.gov/cdrh/comp/guidance/169.html>) Contact OC.

Regulation Number	Class*	Product Code
882.5950	Class II	HCG

(\*If unclassified, see 510(k) Staff)

Additional Product Codes: KRD

Review:	<u></u> (Branch Chief)	<u>NNDB</u> (Branch Code)	<u>4/16/10</u> (Date)
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Final Review:	<u></u> (Division Director)	<u>4/16/10</u> (Date)
---------------	---	--------------------------

**SPECIAL 510(k): Device Modification  
K094018/S001**

Date: **April 5, 2010**  
Reviewer: **Jeffrey Toy, Ph.D.** *JT*  
Division/Branch: **DOED/NNDB**  
Device Name: **Biocompatible UK Ltd LC Bead/Bead Block™ Compressible Microspheres**  
Classification: **Class II** Name: **Neurovascular Embolization Device**  
CFR **882.5950,** Procode: **HCG**  
**870.3300** **KRD**

**To:** THE FILE **RE:** DOCUMENT NUMBER K093919

---

**RECOMMENDATION: SUBSTANTIALLY EQUIVALENT**

This 510(k) submission contains information/data on modifications made to the SUBMITTER'S own Class II, Class III or Class I devices requiring 510(k). The following items are present and acceptable (delete/add items as necessary):

1. The name and 510(k) number of the SUBMITTER'S previously cleared device. (For a preamendments device, a statement to this effect has been provided.)

K033761 GelSphere/Bead Block™ Compressible Microspheres  
K042231 GelSphere/Bead Block™ Compressible Microspheres  
K083091 LC Bead™/Bead Block™ Compressible Microspheres

2. Submitter's statement that the **INDICATION/INTENDED USE** of the modified device as described in its labeling **HAS NOT CHANGED** along with the proposed labeling which includes instructions for use, package labeling, and, if available, advertisements or promotional materials (labeling changes are permitted as long as they do not affect the intended use).

The LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular and arteriovenous malformations.

3. A description of the device **MODIFICATION(S)**, including clearly labeled diagrams, engineering drawings, photographs, user's and/or service manuals in sufficient detail to demonstrate that the **FUNDAMENTAL SCIENTIFIC TECHNOLOGY** of the modified device **has not changed**.

Biocompatibles UK Ltd intend to market LC Bead with an additional **size range of 70-150µm** (currently cleared size ranges include 100-300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ). (b)(4)

(b)(4) Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

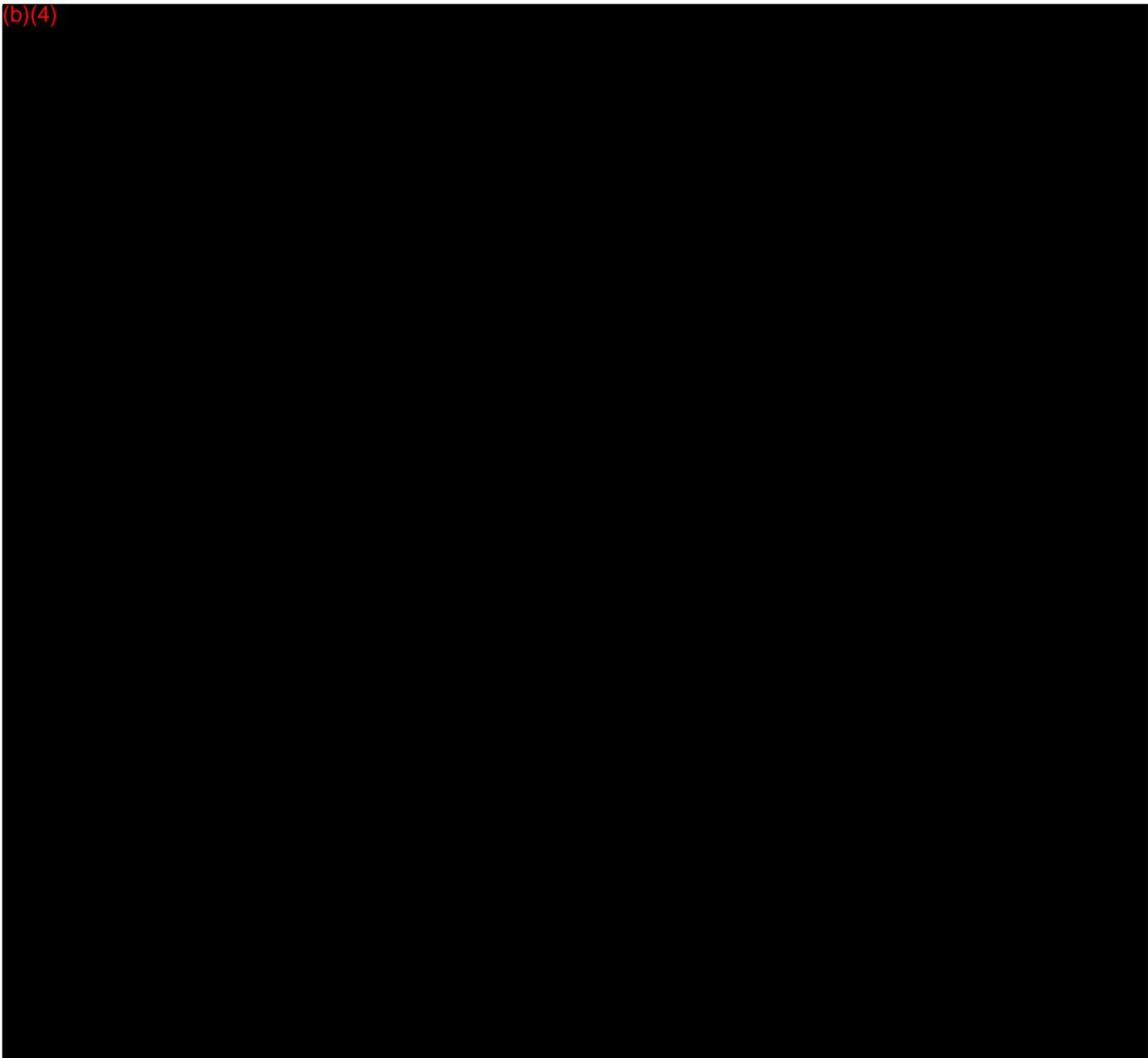
General Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres

can be delivered through typical microcatheters in the 1.8-5Fr range. LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200 $\mu$ m diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

REVIEWER COMMENT: Stampfl et al (2009) noted that particles in general showed a deeper distribution than expected in a minipig kidney arterial occlusion model and Bead Block particles specifically showed a significantly deeper distribution than similarly sized particles. With smaller diameter beads it is possible for the beads to enter the venous side of the circulation and cause embolization in other organs. Maluccio et al saw 8% non-target embolization when using 40-120 $\mu$ m Embospheres. Given the concern with non-target embolization in smaller particles and Bead Block particles tendency to penetrate deeper, an animal study should be conducted to evaluate the penetration and distribution properties of the smaller beads.

(b)(4)



(b)(4)



4. **Comparison Information** (similarities and differences) to applicant's legally marketed predicate device including, labeling, intended use, physical characteristics, and

Biocompatibles UK Ltd intend to market LC Bead with an additional size range of 70-150  $\mu\text{m}$  (currently cleared size ranges include 100–300  $\mu\text{m}$ , 300-500  $\mu\text{m}$ , 500-700  $\mu\text{m}$ , 700-900  $\mu\text{m}$ , and 900-1200  $\mu\text{m}$ . ). (b)(4)

(b)(4) Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

5. A **Design Control Activities Summary** which includes:
- Identification of Risk Analysis method(s) used to assess the impact of the modification on the device and its components, and the results of the analysis
  - Based on the Risk Analysis, an identification of the verification and/or validation activities required, including methods or tests used and acceptance criteria to be applied
  - A declaration of conformity with design controls. The declaration of conformity should include:

- i) A statement signed by the individual responsible, that, as required by the risk analysis, all verification and validation activities were performed by the designated individual(s) and the results demonstrated that the predetermined acceptance criteria were met, and
- ii) A statement signed by the individual responsible, that the manufacturing facility is in conformance with design control procedure requirements as specified in 21 CFR 820.30 and the records are available for review.

Kristen Bowsher reviewed the design control section and determined that it was adequate. Please see her attached engineering review.

Biocompatible provided a signed declaration of conformity with design controls that included items i) and ii) (above). The document was signed by Alistair Taylor, Biocompatible's Director of Regulatory Affairs (17 of 154)

**6. A Truthful and Accurate Statement, a 510(k) Summary or Statement and the Indications for Use Enclosure (and Class III Summary for Class III devices).**

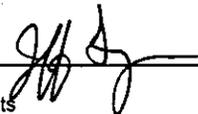
On page 16 of 154, Biocompatible provided a signed truthful and accurate statement. The document was signed by Alistair Taylor, Biocompatible's Director of Regulatory Affairs.

On page 18-21 of 154, MicroVention provided a 510k summary of safety and effectiveness sheet. The 510k summary did not include adequate information as recommended in the SOP for 510k summaries. On April 9, 2010, Biocompatibles (John Greenbaum) emailed a revised 510k summary which I reviewed and determined to be adequate. Please see the attached revised 510k summary.

On page 13 of 35, MicroVention provided the Indication for Use enclosure and the IFU statement is identical to the predicate IFU statement.

On April 7, 2010, Biocompatible emailed a completed FDA Form 3674 – Requirements of ClinicalTrials.gov Data Bank.

The labeling for this modified subject device has been reviewed to verify that the indication/intended use for the device is unaffected by the modification. In addition, the submitter's description of the particular modification(s) and the comparative information between the modified and unmodified devices demonstrate that the fundamental scientific technology has not changed. The submitter has provided the design control information as specified in The New 510(k) Paradigm and on this basis, I recommend the device be determined substantially equivalent to the previously cleared (or their preamendment) device.


4/12/10  
 \_\_\_\_\_  
 (Reviewer's Signature) (Date)  
 Comments

revised:8/1/03

**"SUBSTANTIAL EQUIVALENCE" (SE) DECISION MAKING DOCUMENTATION**

	Yes	No
1. Same Indication Statement?	X	If YES = Go To 3
2. Do Differences Alter The Effect Or Raise New Issues of Safety Or Effectiveness?		If YES = Stop NSE
3. Same Technological Characteristics?	X	If YES = Go To 5
4. Could The New Characteristics Affect Safety Or Effectiveness?		If YES = Go To 6
5. Descriptive Characteristics Precise Enough?		X If NO = Go To 8 If YES = Stop SE
6. New Types Of Safety Or Effectiveness Questions?		If YES = Stop NSE
7. Accepted Scientific Methods Exist?		If NO = Stop NSE
8. Performance Data Available?	X	If NO = Request Data
9. Data Demonstrate Equivalence?	X	Final Decision:SE

Note: See [http://eroom.fda.gov/eRoomReg/Files/CDRH3/CDRHPremarketNotification510kProgram/0\\_4148/FLOWCHART%20DECISION%20TREE%20.DOC](http://eroom.fda.gov/eRoomReg/Files/CDRH3/CDRHPremarketNotification510kProgram/0_4148/FLOWCHART%20DECISION%20TREE%20.DOC) for Flowchart to assist in decision-making process. Please complete the following table and answer the corresponding questions. "Yes" responses to questions 2, 4, 6, and 9, and every "no" response requires an explanation.

1. Explain how the new indication differs from the predicate device's indication:
2. Explain why there is or is not a new effect or safety or effectiveness issue:
3. Describe the new technological characteristics:

(b)(4)

4. Explain how new characteristics could or could not affect safety or effectiveness:
5. Explain how descriptive characteristics are not precise enough:

(b)(4)

6. Explain new types of safety or effectiveness question(s) raised or why the question(s) are not new:
7. Explain why existing scientific methods can not be used:
8. Explain what performance data is needed:

(b)(4)

9. Explain how the performance data demonstrates that the device is or is not substantially equivalent:

(b)(4)



**SPECIAL 510(k): Device Modification  
ODE Review Memorandum**

Date: April 6, 2010

From: Kristen Bowsher, Ph.D.

To: Jeff Toy, Ph.D. (Lead Reviewer, DONED/NNDB)

RE: **K094018/S1**

Device: **Biocompatibles UK Ltd - LC Bead/Bead Block Compressible Microspheres.**

**RECOMMENDATION**

From an engineering perspective I recommend that the device be determined substantially equivalent to legally marketed predicate devices.

**Review Scope**

This review will cover the engineering aspects of the device.

**Review**

This 510(k) submission contains information/data on modifications made to the SUBMITTER'S own Class II, Class III or Class I devices requiring 510(k). The following items are present and acceptable:

1. The name and 510(k) number of the SUBMITTER'S previously cleared device.

LC Bead/Bead Block Compressible Microspheres. Predicate devices include:

Predicate 510(k) #	Predicate Device Name	Predicate Manufacturer
K033761	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K042231	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K083091	LC Bead™ / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.

2. Submitter's statement that the **INDICATION/INTENDED USE** of the modified device as described in its labeling **HAS NOT CHANGED** along with the proposed labeling which includes instructions for use, package labeling, and, if available, advertisements or promotional materials (labeling changes are permitted as long as they do not affect the intended use).

Indications for Use: "LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."

3. A description of the device **MODIFICATION(S)**, including clearly labeled diagrams, engineering drawings, photographs, user's and/or service manuals in sufficient detail to demonstrate that the **FUNDAMENTAL SCIENTIFIC TECHNOLOGY** of the modified device **has not changed**.

Biocompatibles UK Ltd intend to market LC Bead with an additional **size range of 70-150µm** (currently cleared size ranges include 100-300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ).

(b)(4) than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

B

General Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range. LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

4. **Comparison Information** (similarities and differences) to applicant's legally marketed predicate device including, labeling, intended use and physical characteristics.

Biocompatibles UK Ltd intend to market LC Bead with an additional size range of 70-150 µm (currently cleared size ranges include 100-300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ).

(b)(4) than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

Reviewer Comments

Although the size range of the requested LC Bead (i.e., 70-150 µm) is smaller than the sponsor's own predicate devices it is in the range of legally marketed PVA microspheres. I have identified the following 510(k)s (just as a sampling and there are probably additional cleared 510(k)s) that include PVA particles that are in the range of the requested particle size:

- K001678 – Surgica Corp. PVA particles include 45-90 µm size
- K061790 – Protein Polymer Tech., Inc. particles include 45-90 µm size
- K042297 – Acta Vascular Systems, Inc. particles include 50-150 µm size
- K052742 – Biosphere Medical, Inc. particles include 50-100 µm size
- K030966 – Boston Scientific particles include 45-150 µm size

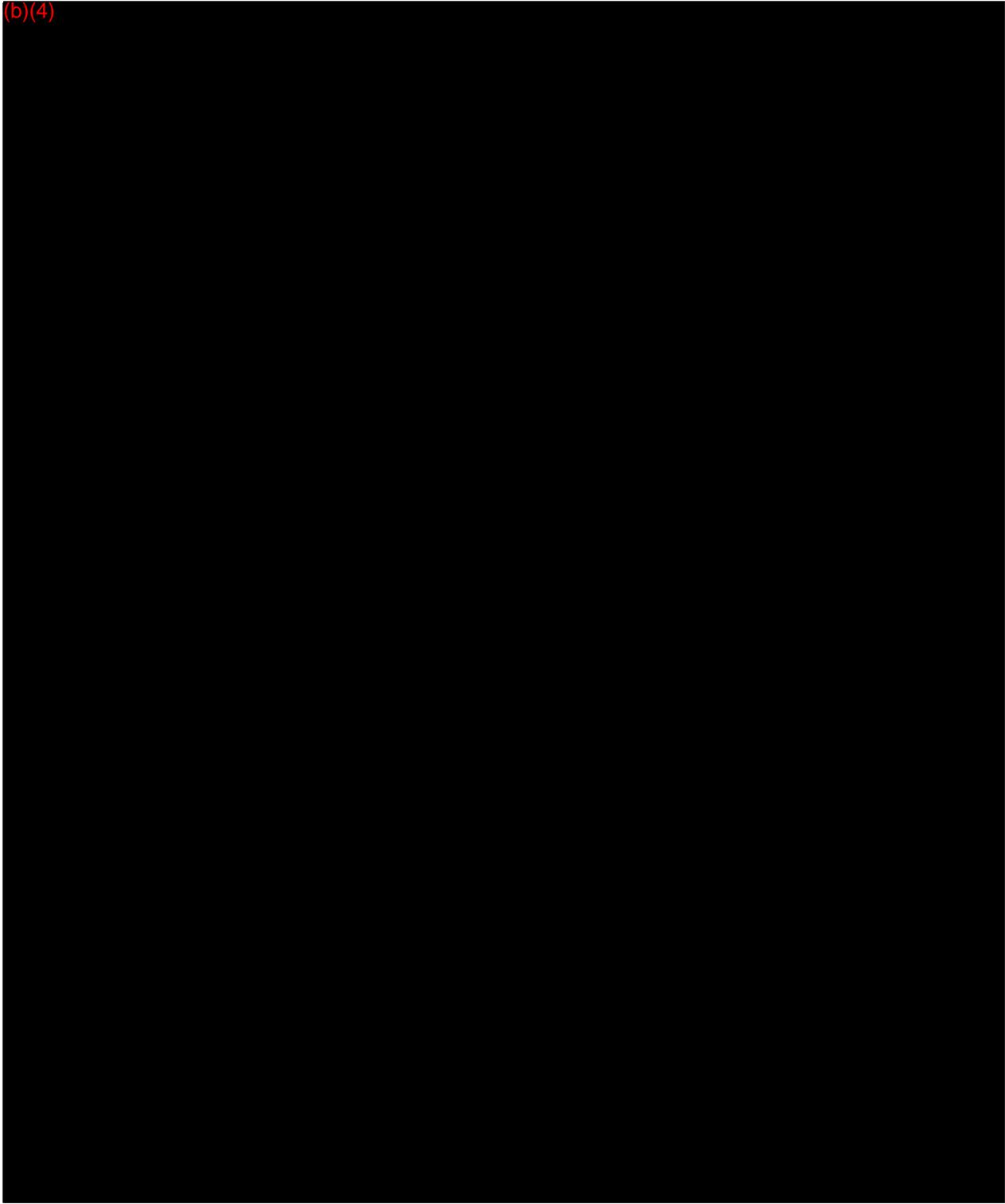
Thus, the particle size requested is in the range of legally marketed predicate devices.

5. **A Design Control Activities Summary** which includes:
- a) Identification of Risk Analysis method(s) used to assess the impact of the modification on the device and its components, and the results of the analysis
- See Appendix III, page 120.
- b) Based on the Risk Analysis, an identification of the verification and/or validation activities required, including methods or tests used and acceptance criteria to be applied

In-vitro testing included the following:

(b)(4)

(b)(4)



**Reviewer Comments**

The sponsor indicates that the beads passed all of the testing that was performed. The testing performed is adequate. However, the sponsor has not provided the compression modulus (kPa) of the beads which is a measure of the compressibility or softness of the microspheres. Particle size, performance of the bead within a catheter and compression moduli, are all attributes that directly assess the physical comparability of the subject and predicate devices. Note that this attribute has been provided/requested inconsistently in predicate

510(k) applications (meaning it was not provided or requested in many of the submissions). However, it was provided and reviewed in the sponsor's predicate device K023089 and the reviewer considered it an important characteristic in determining substantial equivalence. This type of testing was also required in K052509.

(b)(4)

**The sponsor was asked to provide the following additional information:**

**The compression modulus is an important characteristic for assessing the physical comparability of your proposed device to legally marketed predicate devices. Therefore, please provide the compression modulus of the 70-150µm LC Beads, compare them to a legally marketed predicate device, and discuss why any differences should not affect the safety and effectiveness of the 70-150µm LC Beads as compared to legally marketed predicate devices. Alternatively, please justify why this parameter is not important in assessing the safety and effectiveness of the device as compared to legally marketed predicate devices.**

**Sponsor's Response**

(b)(4)

We confirm;  
"The specification for all bead sizes, is unchanged from K023089 (BioCure, Inc.) and K042231 (Biocompatibles UK Ltd.)"

**Reviewer Comments**

(b)(4)

(b)(4)

**Therefore, this response is adequate.**

**RECOMMENDATION**

From an engineering perspective I recommend that the device be determined substantially equivalent to legally marketed predicate devices.





# English

## LC Bead™ Embolic Agent

### INSTRUCTIONS FOR USE

STERILE  
SINGLE USE ONLY  
NON-PYROGENIC

Sterilized by steam  
*Do not use if the package is opened or damaged*

#### DESCRIPTION:

LC Bead are hydrogel microspheres that are biocompatible, hydrophilic, nonresorbable and precisely calibrated. LC Bead are produced from polyvinyl alcohol and available in the following size :

Size	Label Color
70 – 150 µm	Turquoise

#### PRESENTATION:

- Glass vial of 10ml
- Stopper sealed by an aluminum cap equipped with a colored cap
- Each vial contains approximately 2 ml of LC Bead in a non-pyrogenic sterile physiological buffered saline.
- Each vial is intended for single patient use only. Do not resterilize. Discard any unused material

#### INDICATIONS:

LC Bead are intended to be used for the embolization of hypervascular tumors and arteriovenous malformations (AVMs).

#### CLINICAL APPLICATIONS:

The scientific literature provides extensive documentation of embolization procedures using a wide variety of artificial agents in both neurological and peripheral vascular systems, including the head, neck, spine, liver, genitourinary tract, uterus, gastrointestinal system, limbs and lungs. A representative bibliography is provided following these instructions for use.

#### CONTRAINDICATIONS:

1. Patients intolerant to occlusion procedures.
2. Vascular anatomy or blood flow that precludes catheter placement or emboli injection.
3. Presence or likely onset of vasospasm.
4. Presence or likely onset of hemorrhage.
5. Presence of severe atheromatous disease.
6. Presence of feeding arteries smaller than distal branches from which they emerge.
7. Presence of patent extra-to-intracranial anastomoses or shunts.
8. Presence of collateral vessel pathways potentially endangering normal territories during embolization.
9. Presence of end arteries leading directly to cranial nerves.
10. Presence of arteries supplying the lesion not large enough to accept LC Bead.
11. Vascular resistance peripheral to the feeding arteries precluding passage of LC Bead into the lesion.
12. Do not use LC Bead in the following applications:
  - i. Embolization of large diameter arteriovenous shunts (ie. where the blood does not pass through the arterial/capillary/venous transition but directly from artery to vein.
  - ii. The pulmonary arterial vasculature.
  - iii. Any vasculature where LC Bead Embolic Agent could pass directly into the internal carotid artery or other non-target territories

**WARNING:** Studies have shown that LC Bead do not form

aggregates and, as a result, penetrate deeper into the vasculature as compared to similarly sized PVA particles. Care must be taken to choose a larger sized LC Bead Embolic Agent when embolizing arteriovenous malformations with large shunts to avoid passage of the microspheres into the pulmonary or coronary circulation.

The color of the LC Bead could be visible through the skin if injected into arteries feeding superficial tissues.

#### CAUTIONS:

- Do not use if the vial or packaging appear damaged.
- Sterile and single use product. Do not reuse.
- Select the size and quantity of LC Bead appropriate for the pathology to be treated.
- Ensure that LC Bead is an appropriate size for the intended vasculature.
- Monitor patients carefully for signs of non-target embolization such as hypoxia or CNS changes.
- Consider upsizing LC Bead if angiographic evidence of embolization does not appear quickly during delivery'.
- Embolization with LC Bead should only be performed by physicians who have received appropriate interventional occlusion training in the region intended to be embolized.

**CAUTION:**  
Federal (USA) law restricts this device to sale by or on order of a physician.

#### POTENTIAL COMPLICATIONS:

1. Undesirable reflux or passage of LC Bead into normal arteries adjacent to the targeted lesion or through the lesion into other arteries or arterial beds, such as the internal carotid artery, pulmonary, or coronary circulations.
2. Non-target embolization
3. Pulmonary embolization.
4. Ischemia at an undesirable location.
5. Capillary bed saturation and tissue damage.
6. Ischemic stroke or Ischemic infarction.
7. Vessel or lesion rupture and hemorrhage.
8. Neurological deficits including cranial nerve palsies.
9. Vasospasm.
10. Death.
11. Recanalization.
12. Foreign body reactions necessitating medical intervention.
13. Infection necessitating medical intervention.
14. Clot formation at the tip of the catheter and subsequent dislodgement.

#### CONSERVATION AND STORAGE:

- LC Bead must be stored in a cool, dry and dark place in its original packaging.
- Use by the date indicated on the vial label.
- Do not freeze.

#### INSTRUCTIONS FOR USE:

- Carefully evaluate the vascular network associated with the lesion using high resolution imaging prior to beginning the embolization procedure.
- LC Bead are available in a range of sizes. Care should be taken to choose the appropriate size LC Bead that best matches the pathology (ie. vascular target/vessel size) and provides the desired clinical outcome.
- When embolizing arteriovenous malformations, choose a particle size that will occlude the nidus without passing through the AVM.
- Choose a delivery catheter based on the size of the target vessel. LC Bead can tolerate temporary compression of 20% to 30% in order to facilitate passage through the delivery catheter.
- Introduce the delivery catheter into the target vessel according to standard techniques. Position the catheter tip as close as possible to the treatment site to avoid inadvertent occlusion of normal vessels.

- LC Bead are not radio-opaque. It is recommended to monitor the embolization under fluoroscopic visualization by adding the desired amount of contrast medium to the suspension fluid.

To deliver LC Bead.

- After shaking the vial containing the LC Bead, dilute the product with contrast medium either in a metallic/stainless steel cup or directly in the vial.
  - Take care to ensure proper suspension of the microspheres in the contrast medium to enhance distribution during injection.
  - Draw the LC Bead into a syringe needle of a size greater than or equal to 19 gauge (1.07 mm).
  - Slowly inject LC Bead into the delivery catheter under fluoroscopic visualization while observing the contrast flow rate. If there is no effect on the flow rate, choose a larger microsphere size and repeat the delivery process. Exercise conservative judgment in determining the embolization endpoint.
- Upon completion of the treatment, remove the catheter while maintaining gentle suction so as not to dislodge LC Bead still within the catheter lumen.
- Discard any open, unused LC Bead.

- Clouse ME: Hepatic artery embolization for bleeding and tumours. *Surg Clin N Am*, 69(2): 419-432, Apr 1989.
- Derdyn C, Graves, V, Salamat M, Rappe A: Collagen-coated acrylic microspheres for embolotherapy: In vivo and in vitro characteristics. *AJNR*, 18:647-653, April 1997.
- Deveikis JP: endovascular therapy of intracranial arteriovenous malformations: materials and techniques. *Neuroimaging Clin of N Am*, 8(2):401-424, 1998.
- Encarcacion CE, Kadir S, Beam CA, Payne CS: Gastrointestinal bleeding: Treatment with gastrointestinal arterial embolization. *Radiol*, 183(2):505-508, May 1992.
- Frizzel RT, Fisher WS: Cure, morbidity and mortality associated with embolization of brain arteriovenous malformations: A review of 1246 patients in 32 series over a 35-year period. *Neurosurg*, 37(6): 1031-1040, Dec 1995.
- Laurent A, Beaujeux R, Wassef M, et al: Trisacryl gelatin microspheres for therapeutic embolization, I: Development and in vitro evaluation. *AJNR* 17:533-540, March 1996.
- Rose SC: Transcatheter occlusion of injured extremity and pelvic arteries. In: *Peripheral Vascular Intervention*.
- Bendszus M, Klein R, Burger R, et al: Efficacy of trisacryl gelatin microspheres versus polyvinyl alcohol particles in the preoperative embolization of meningiomas. *AJNR*, 21(2):255-261, Feb 2000.

PACKAGE LABEL:

<b>REF</b>	Catalogue number
<b>LOT</b>	Batch number/Lot number
	Do not reuse
	Attention see instructions for use
	Steam Sterilized
	Use before/Expiry
	Protect from light
	Protect from moisture
	Do not freeze

0°C

Patents

US 5,583,163  
 US 6,652,883  
 US 6,676,971

Other patents pending

Manufactured by:  
**Biocompatibles UK Limited**  
 Chapman House  
 Farnham Business Park  
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 Surrey GU9 8QL  
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Tel: +44 (0)1252 732 732  
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<http://www.biocompatibles.com>

REFERENCES:

- Ahuja A, Gibbons K: Endovascular therapy of central nervous system tumours. *Neurosurg Clin of N Am*, 5(3): 541-554, 1994.
- Ajani JA, Carrasco CH, Wallace S: Neuroendocrine tumours metastatic to the liver: Vascular occlusion therapy. *Ann NY Acad Sci*, 733: 479-487, Sep 1994.
- Beaujeux R, Laurent A, Wassef M et al: Trisacryl gelatin microspheres for therapeutic embolization, II: Preliminary clinical evaluation in tumours and arteriovenous malformations. *AJNR*, 17: 541-548, March 1996.
- Bendszus M, Klein R, burger R, et al: Efficacy of trisacryl gelatin microspheres and polyvinylalcohol (PVA) particles in the preoperative embolization of meningiomas. Presented at the ASNR 36<sup>th</sup> Annual Meeting, May 17-21, 1998.
- Charnsangavej C, Wallace S: Transcatheter regional therapy of extremity tumours. In: *Peripheral Vascular Intervention*.

CN00165.1













## 510K Summary (K094018)

### Submitter:

Biocompatibles UK Ltd.  
Chapman House  
Weydon Lane, Farnham,  
Surrey, GU9 8QL  
United Kingdom

+44 1252732732

### Contact:

Dr. Alistair Taylor, Director of Quality and Regulatory Affairs

## 1 Common name, Trade name(s) & Classification

Trade name(s): LC Bead Microspheres & BeadBlock Microspheres

Common name(s) & Codes:

Vascular Embolization Device, embolization, arterial (Code: KRD)

Neurovascular Embolization Device, artificial embolization (Code: HCG)

## 2 510(k) Numbers and Product Codes of equivalent devices.

Biocompatibles UK Ltd  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number: K033761  
Product Code: HCG/KRD  
**CFR Section: 882.5950**

Biocompatibles UK Ltd.  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number(s): K042231/K083091  
Product Code: HCG/KRD  
**CFR Section: 870.3300/882.5950**

### 3 Indications for Use and Intended Population

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

### 4 Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range.

LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in the table. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

Product	Volume of beads (mL)	Volume PBS (mL)	Total volume (mL)
LC Bead Microspheres	1	7	8
	2	6	8
Bead Block Compressible Microspheres	1	5	6
	2	4	6

LC Bead/Bead Block product configurations.

### 5 Similarities and Differences to Predicates

The intended use of LC Bead/Bead Block and the predicate device are the same and unchanged. Biocompatibles UK Ltd intend to market LC Bead with an additional SKU in the size range of 70-150µm. Only minor process modifications were made to allow for the

production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

## 6 Physical Properties and Characteristics

LC Bead & Bead Block are preformed, soft, deformable microspheres which consist of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Compressed beads will recover to their original size (e.g. when compressed passing through a catheter, the beads will return to their original size after exiting the catheter). This Pre-Market notification adds the size range of 70-150 $\mu$ m for the blue dyed version of LC Bead. Both products are supplied in a variety of size ranges as follows:

Product Code	Size Range ( $\mu$ m)	Quantity Bead Block (mL)	Quantity PBS (mL)
EB1S103	100-300	1	5
EB1S305	300-500	1	5
EB1S507	500-700	1	5
EB1S709	700-900	1	5
EB1S912	900-1200	1	5
EB2S103	100-300	2	4
EB2S305	300-500	2	4
EB2S507	500-700	2	4
EB2S709	700-900	2	4
EB2S912	900-1200	2	4

Bead Block available size ranges

Product Code	Size Range ( $\mu$ m)	Quantity LC Bead (mL)	Quantity PBS (mL)
UB1V103	100-300	1	7
UB1V305	300-500	1	7
UB1V507	500-700	1	7
UB1V709	700-900	1	7
UB1V912	900-1200	1	7
UB2V103	100-300	2	6
UB2V305	300-500	2	6
UB2V507	500-700	2	6
UB2V709	700-900	2	6
UB2V912	900-1200	2	6

LC Bead (undyed) available size ranges

Product Code	Size Range ( $\mu\text{m}$ )	Quantity LC Bead (mL)	Quantity PBS (mL)
VE110GS	70-150	1	7
VE210GS	100-300	1	7
VE410GS	300-500	1	7
VE610GS	500-700	1	7
VE810GS	700-900	1	7
VE1010GS	900-1200	1	7
VE120GS	70-150	2	6
VE220GS	100-300	2	6
VE420GS	300-500	2	6
VE620GS	500-700	2	6
VE820GS	700-900	2	6
VE1020GS	900-1200	2	6

LC Bead (dyed) available size ranges

### 6.1 Differences between LC Bead and Bead Block

Bead Block is dyed blue using an FDA approved dye (used in contact lenses) to aid in the visualization of the microspheres in the delivery syringe (LC Bead are available as blue and in natural color). Bead Block is provided in a polycarbonate sterile syringe, LC Bead is provided in a sterile glass vial. The primary difference between LC Bead and Bead Block products, aside from the packaging relates to the degree of functionalisation of the macromer and the ratios of initiators used in the reaction which results in differences in the degree of crosslinking of the polymer in the microspheres.

This pre-market notification relates only to the addition of a size fraction for LC Bead in the range of 70-150 $\mu\text{m}$  which is a subgroup of the currently marketed LC Bead 100-300 $\mu\text{m}$  product and the 70-150 $\mu\text{m}$  size specification falls within that of the cleared 100-300  $\mu\text{m}$  LC Bead size range. Please refer to Section 8: In-Vitro testing for further product characterization information. There is no change to the product supplied under the Bead Block trade name.

## 7 Summary of Non-clinical data

LC Bead and Bead Block have been tested in pre-clinical models for biocompatibility and safety in accordance with the FDA Guidance for Industry and staff; Class II Special Controls Guidance Document: Vascular and Neurovascular Embolization Devices.

### 7.1 Tests of Biocompatibility

Tests for biocompatibility were conducted in accordance with ISO 10993 parts 1, 3, 4, 6, 10 and 11 (listed in section 9), the products conform to the relevant requirements of these standards.

<b>Biocompatibility Test</b>	<b>Pass/Fail</b>
Genotoxicity: In Vitro Chromosomal Aberration Study in Mammalian Cells	Pass
Mouse Bone Marrow Micronucleus Study	Pass
In Vitro Hemolysis Study (Modified ASTM-Direct Contact Method)	Pass
ISO Muscle Implantation Study in the Rabbit	Pass
Cytotoxicity Study using the ISO Elution Method	Pass
ISO Sensitization Study in the Guinea Pig	Pass
ISO Acute Intracutaneous Reactivity Study in the Rabbit	Pass
Chronic Toxicity Study in the Rat following Subcutaneous Implantation (13 weeks)	Pass
Subchronic Intravenous Toxicity Study in the Rat (14 day, saline extract)	Pass
Genotoxicity: Bacterial Reverse Mutation Study	Pass
ISO Acute Systemic Toxicity Study in the Mouse (liquid/chemical)	Pass
ISO Surgical Muscle Implantation in the Rabbit (26 weeks)	Pass

## 7.2 Pre-clinical testing in a large animal model

### Summary of the Evaluation of LC Bead (formerly Gelspheres) Embolic Agent in a Swine Embolization Model

The purpose of this study was to evaluate, characterize and compare the performance of LC Bead Embolic Agent (n=36) and Embosphere® microspheres (n=36) in a swine bilateral partial renal artery embolization model in order to assess the ability of these agents to occlude the vessel.

The primary outcomes for this study were assessment of:

- (1) recanalization of the vessels, and,
- (2) local and systemic foreign body tissue reactions.

The secondary outcomes were assessment of:

- (1) ease of delivery of the embolic agent,
- (2) the occurrence of blood vessel rupture
- (3) non-target embolization/device migration.

LC Bead Embolic Agent and Embospheres microspheres performed in a substantially equivalent manner at 2, 7 and 28 days for all parameters except recanalization, where LC Bead appears to have an advantage of having a more durable embolization effect. The tissue reaction for both LC Bead and Embospheres was very mild and was essentially the same. Both embolic agents delivered easily, but Embospheres had six cases of catheter clogging out of 36 cases. There was

only one case of catheter clogging with LC Bead. There were no incidents of blood vessel rupture during the embolization procedures. There was one case of unexplained non-target embolization with Embospheres and none with LC Bead. Alternatively, there was one potential case of device migration with LC Bead and none with Embospheres.

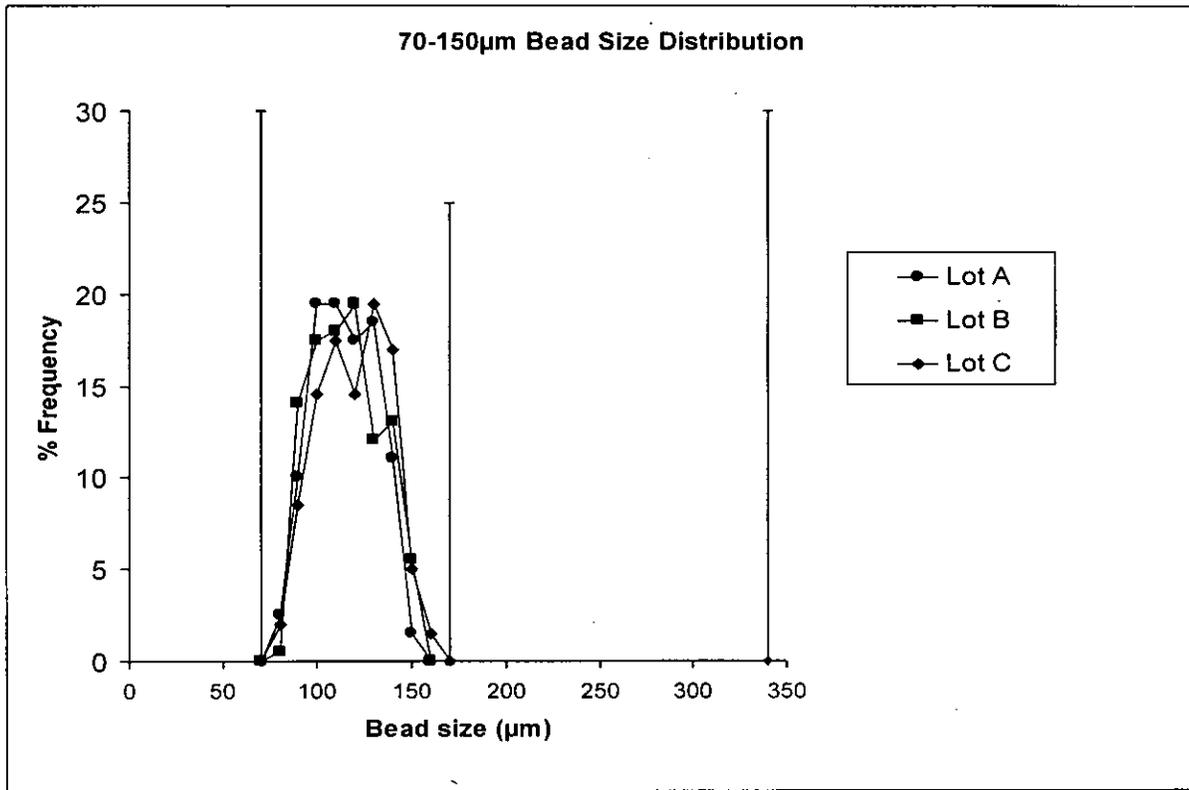
## 8 Summary of In-Vitro testing

Both LC Bead and Bead Block have been extensively tested and subject to product and process validation and verification testing. A summary of key characteristics for which test data has been provided in this 510K, are described in this section.

### 8.1 Size distribution

Data was provided in this pre market notification regarding the verification and validation of the new size range of LC Bead. The table and illustration below provide the results of these tests and demonstrate that all product met specification with respect to bead size.

Product	Sizing Specification	Fibres Specification
Current LC Bead 100-300µm	Pass	Pass
LC Bead 70-150µm	Pass	Pass



## 8.2 Compressibility

LC Bead has equivalent compressibility to other marketed embolic agents.

## 8.3 Catheter Delivery

Catheter delivery characteristics have been tested in accordance with a written protocol to assure performance with typical microcatheters. The table below provides a summary of the test results for the current marketed LC Bead product and the 70-150µm size fraction.

Catheter ID		Microcatheter Name	LC Bead/ size ranges (µm)				
(inches)	(µm)		70-150	100-300	300-500	500-700	700-900
0.024	610	5Fr. Angio Dynamics	✓	✓	✓	✓	✓
0.024	610	FasTracker® 325	✓	✓	✓	✓	✓
0.021	540	FasTracker® 18	✓	✓	✓	✓	
0.021	540	Cook 3.0 Fr	✓	✓	✓	✓	
0.016	420	Prowler® 14	✓	✓	✓		
0.022	570	2.4Fr Progreat™ Terumo	✓	✓	✓		
0.018	457	Spinnaker Elite1.8	✓	✓	✓		

✓	Catheter can be used for the effective delivery of the LC Bead product.
---	---

#### 8.4 Other tests

Additional bead characterization data has been provided in this pre-market notification with respect to other attributes of the device. A summary of this additional test data is provided below.

Test	Pass/Fail
<p><b>Residual starting materials</b>  <i>The residual starting materials present in the final packaged device.</i></p>	Pass
<p><b>Residual solvents</b>  <i>The residual solvent levels present in the final packaged device.</i></p>	Pass
<p><b>Product visual inspection for presence of fibres</b>  <i>The visual assessment of a sample of the final product to determine the level of fibres present.</i></p>	Pass
<p><b>Product catheter deliverability</b>                      Bead Aggregation/Clogging:  <i>The incidence of any unintended bead aggregation in the syringe resulting in catheter blockage is assessed during catheter delivery testing.</i>                      Ease of Delivery:  <i>The ease of delivery is assessed as part of catheter delivery testing and must be considered "not difficult" in order to pass this test.</i>                      Shape after embolic after injection:  <i>The shape of the embolic agent is evaluated after catheter delivery using optical microscopy.</i>                      Bead Deliverability:  <i>The ability to deliver the whole vial of beads mixed with contrast agent through a catheter as described in the Instructions for Use.</i>                      Levels of broken or bead fragments after catheter delivery:  <i>The presence of broken is evaluated after catheter delivery using optical microscopy.</i></p>	Pass
<p><b>Time to Suspension Studies</b>  <i>The time taken for the beads to form a stable homogeneous suspension when mixed with the recommended ratio of contrast agent and saline/water</i></p>	Pass
<p><b>Bead aspiration from vial</b>  <i>The ease of removing the beads from the primary packaging using standard syringes and needles as described in the Instructions for Use.</i></p>	Pass
<p><b>Bead sizing</b>  <i>The size of the beads after packaging and sterilisation.</i></p>	Pass
<p><b>pH Testing</b>  <i>The pH of the final packing solution after sterilisation.</i></p>	Pass

## 9 Performance Standards

LC Bead/Bead Block Compressible Microspheres meet the following Performance Standards:

- Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products.
- ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part 1: Evaluation and Testing.
- ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.
- ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.
- ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.
- ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.
- ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.
- ISO/EN 11607; 1997 – Packaging for terminally sterilized products.
- AAMI 17665-1; 2006 – Sterilization of Health Care Products Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ANSI/AAMI/ISO 14937; 2009 – Sterilization of Health Care Products Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.
- ISO 14971; 2007 – Medical Devices – Application of Risk Management

### 9.1 Conclusion

There are more similarities than differences between the predicate device and the LC Bead/Bead Block products. This Premarket Notification explains the minor revisions made to the manufacturing process to enable production of the additional smaller diameter SKU which is a subset of the currently cleared 100-300 LC Bead product. The primary packaging, indications for use, specifications and chemistry are unchanged from K033761/K042231/K083091. The predicate device and LC Bead/Bead Block products have the same intended use, warnings and contraindications. The predicate device and LC Bead/Bead Block products are identical other than the added size range, in design, and unchanged from the predicate device. When used in

accordance with the instructions for use, by qualified personnel, the LC Bead/Bead Block products are safe and effective, as indicated, for the intended use.





510(k) Number(if known): K094018

Device Name:

**LC Bead Microspheres  
Bead Block™ Compressible Microspheres**

Indications For Use:

***"LC Bead Microspheres & Bead Block™ Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

---

Prescription Use X OR Over-The-Counter Use    

(Per 21 CFR 801.109)

PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF  
NEEDED)

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Concurrence of CDRH, Office of Device Evaluation (ODE)

(Optional Format 1-2-96)

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DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Food and Drug Administration

Certification of Compliance, under 42 U.S.C. § 282(j)(5)(B), with  
Requirements of ClinicalTrials.gov Data Bank (42 U.S.C. § 282(j))

For submission with an application/submission, including amendments, supplements, and resubmissions, under §§ 505, 515, 520(m), or 510(k) of the Federal Food, Drug, and Cosmetic Act or § 351 of the Public Health Service Act.)

SPONSOR / APPLICANT / SUBMITTER INFORMATION

1. NAME OF SPONSOR/APPLICANT/SUBMITTER <u>Biocompatibles UK LTD</u>	2. DATE OF THE APPLICATION/SUBMISSION WHICH THIS CERTIFICATION ACCOMPANIES <u>4/7/2010</u>
3. ADDRESS (Number, Street, State, and ZIP Code) <u>Chapman House, Weydon Lane Farnham, Business Park Farnham, Surrey, England GU9 8QL</u>	4. TELEPHONE AND FAX NUMBERS (Include Area Code) (Tel.) <u>954-610-0178</u> (Fax) <u>954-653-1153</u>

PRODUCT INFORMATION

5. FOR DRUGS/BIOLOGICS: Include Any/All Available Established, Proprietary and/or Chemical/Biochemical/Blood/Cellular/Gene Therapy Product Name(s)  
FOR DEVICES: Include Any/All Common or Usual Name(s), Classification, Trade or Proprietary or Model Name(s) and/or Model Number(s)  
(Attach extra pages as necessary),

Bead Block, LC Bead

Gelspheres

APPLICATION / SUBMISSION INFORMATION

6. TYPE OF APPLICATION/SUBMISSION WHICH THIS CERTIFICATION ACCOMPANIES

IND     NDA     ANDA     BLA     PMA     HDE     510(k)     PDP     Other

INCLUDE IND/NDA/ANDA/BLA/PMA/HDE/510(k)/PDP/OTHER NUMBER (If number previously assigned)

8. SERIAL NUMBER ASSIGNED TO APPLICATION/SUBMISSION WHICH THIS CERTIFICATION ACCOMPANIES

K094018

CERTIFICATION STATEMENT / INFORMATION

9. CHECK ONLY ONE OF THE FOLLOWING BOXES (See instructions for additional information and explanation)

A. I certify that the requirements of 42 U.S.C. § 282(j), Section 402(j) of the Public Health Service Act, enacted by 121 Stat. 823, Public Law 110-85, do not apply because the application/submission which this certification accompanies does not reference any clinical trial.

B. I certify that the requirements of 42 U.S.C. § 282(j), Section 402(j) of the Public Health Service Act, enacted by 121 Stat. 823, Public Law 110-85, do not apply to any clinical trial referenced in the application/submission which this certification accompanies.

C. I certify that the requirements of 42 U.S.C. § 282(j), Section 402(j) of the Public Health Service Act, enacted by 121 Stat. 823, Public Law 110-85, apply to one or more of the clinical trials referenced in the application/submission which this certification accompanies and that those requirements have been met.

10. IF YOU CHECKED BOX C, IN NUMBER 9, PROVIDE THE NATIONAL CLINICAL TRIAL (NCT) NUMBER(S) FOR ANY "APPLICABLE CLINICAL TRIAL(S)," UNDER 42 U.S.C. § 282(j)(1)(A)(i), SECTION 402(j)(1)(A)(i) OF THE PUBLIC HEALTH SERVICE ACT, REFERENCED IN THE APPLICATION/SUBMISSION WHICH THIS CERTIFICATION ACCOMPANIES (Attach extra pages as necessary)

NCT Number(s): \_\_\_\_\_

The undersigned declares, to the best of her/his knowledge, that this is an accurate, true, and complete submission of information. I understand that the failure to submit the certification required by 42 U.S.C. § 282(j)(5)(B), section 402(j)(5)(B) of the Public Health Service Act, and the knowing submission of a false certification under such section are prohibited acts under 21 U.S.C. § 331, section 301 of the Federal Food, Drug, and Cosmetic Act. Warning: A willfully and knowingly false statement is a criminal offense, U.S. Code, title 18, section 1001.

11. SIGNATURE OF SPONSOR/APPLICANT/SUBMITTER OR AN AUTHORIZED REPRESENTATIVE (Sign) 	12. NAME AND TITLE OF THE PERSON WHO SIGNED IN NO. 11 (Name) <u>John Greenbaum</u> (Title) <u>Six Correspondent &amp; US Agent</u>
13. ADDRESS (Number, Street, State, and ZIP Code) (of person identified in Nos. 11 and 12) <u>20310 SW 48th Street Southwest Ranches, FL 33332</u>	14. TELEPHONE AND FAX NUMBERS (Include Area Code) (Tel.) <u>954-610-0178</u> (Fax) <u>954-653-1153</u>
	15. DATE OF CERTIFICATION <u>4/7/2010</u>

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### Standard Operating Procedures for 510(k) Summaries

- 1) If a 510(k) submitter decides to submit a 510(k) summary, as per 21 CFR 807.87(h), they need to follow the content requirements as per 21 CFR 807.92.
- 2) If during the review of the 510(k), the submitter decides to switch to a 510(k) statement, as per 21 CFR 807.87(h), they may do so while the 510(k) is under review. They must follow 21 CFR 807.93 for a 510(k) statement.
- 3) The 510(k) summary is written by the 510(k) submitter, but FDA will agree with the content prior to clearing any 510(k).
- 4) The 510(k) summary needs to agree with the final classification decision of FDA, e.g., the predicate classification needs to match the FDA classification decision. The submitter may need to revise the summary while the 510(k) is under review. In other words, the 510(k) summary will need to reflect the predicate(s) and decision made by FDA. The submitter will then need to revise the summary while the 510(k) is under review.
- 5) The IFU provided in the 510(k) summary needs to match the IFU statement that is determined to be substantially equivalent
- 6) The 510(k) summary should reflect all the testing done by the 510(k) submitter to demonstrate substantial equivalence. This may include testing that FDA did/ would not require to demonstrate substantial equivalence, but would include all testing that FDA does/ would require to demonstrate substantial equivalence.
- 7) If the 510(k) summary is deficient, the deficiency(ies) may be put in an AI letter or handled through interactive review.
- 8) The 510(k) may not be found to be substantially equivalent until the 510(k) summary meets the regulatory requirements of 21 CFR 807.92.
- 9) If, after interactions, a 510(k) submitter does not revise the 510(k) summary as requested and we disagree with their rationale, the 510(k) may be found not substantially equivalent for lack of required data/ information.
- 10) Neither the 510(k) summary, nor 510(k) statement, are needed if the decision is other than SE.
- 11) The 510(k) summary will go on FDA's website approximately the 5<sup>th</sup> of the month following any SE decision.

### 510(k) SUMMARY REQUIREMENTS CHECKLIST 21 CFR 807.92

		Y	N	N/A
All 510(k) summaries shall contain the following information:				
1	The submitter's name, address, telephone number, a contact person, and the	✓		

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	date the summary was prepared			
2	The name of the device, including the trade or proprietary name if applicable, the common or usual name, and the classification name	✓		
3	An identification of the legally marketed device(s) to which the submitter claims equivalence.	✓		
4	A description of the device that is the subject of the 510(k), including an explanation of how the device functions, the scientific concepts that form the basis for the device, and the significant physical and performance characteristics of the device (e.g., device design, material used, and physical properties)	✓		
5	A statement of the indications for use of the device that is the subject of the 510(k), including a general description of the diseases or conditions that the device will diagnose, treat, prevent, cure, or mitigate, including a description, where appropriate, of the patient population for which the device is indicated. Or, if the indication statements are different from those of the legally marketed device(s) identified in paragraph (3) of this section, an explanation as to why the differences are not critical to the intended therapeutic, diagnostic, prosthetic, surgical or other use of the device, and why the differences do not affect the safety and effectiveness of the device when used as indicated.	✓		
6	If the device has the same technological characteristics (i.e., design, material, chemical composition, energy source, etc.) as the predicate device(s) identified in paragraph(3) of this section, a summary of the technological characteristics of the new device in comparison to those of the predicate device(s). Or, if the device has different technological characteristics from the predicate device(s), a summary of how the technological characteristics of the device compare to a legally marketed device(s) identified in paragraph (3) of this section.	✓		
510(k) summaries for those 510(k)s in which a determination of substantial equivalence is also based on an assessment of performance data shall contain the following information				
7	A brief discussion of the nonclinical tests submitted, referenced, or relied on in the 510(k) for a determination of substantial equivalence	✓		
8	A summary discussion of the clinical tests submitted, referenced, or relied on in the 510(k) for a determination of substantial equivalence. This discussion shall include, where applicable, a description of the subjects upon whom the device was tested, a discussion of the safety or effectiveness data obtained from the testing, with specific reference to adverse effects and complications, and any other information from the clinical testing relevant to a determination of substantial equivalence. (There can not be any patient identifier information in the summary.)			Not applicable
9	The conclusions drawn from the nonclinical and clinical tests that demonstrate that the device is as safe, as effective, and performs at least as safely and effectively as the legally marketed device identified in paragraph(3) of this section.	✓		

## 510K Summary (K094018)

### Submitter:

Biocompatibles UK Ltd.  
Chapman House  
Weydon Lane, Farnham,  
Surrey, GU9 8QL  
United Kingdom

+44 1252732732

### Contact:

Dr. Alistair Taylor, Director of Quality and Regulatory Affairs

## 1 Common name, Trade name(s) & Classification

Trade name(s): LC Bead Microspheres & BeadBlock Microspheres

Common name(s) & Codes:

Vascular Embolization Device, embolization, arterial (Code: KRD)

Neurovascular Embolization Device, artificial embolization (Code: HCG)

## 2 510(k) Numbers and Product Codes of equivalent devices.

Biocompatibles UK Ltd  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number: K033761  
Product Code: HCG/KRD  
**CFR Section: 882.5950**

Biocompatibles UK Ltd.  
GelSpheres Microspheres  
Bead Block Compressible Microspheres  
510K Number(s): K042231/K083091  
Product Code: HCG/KRD  
**CFR Section: 870.3300/882.5950**

### 3 Indications for Use and Intended Population

***"LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."***

### 4 Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consist of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range.

LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in the table. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

Product	Volume of beads (mL)	Volume PBS (mL)	Total volume (mL)
LC Bead Microspheres	1	7	8
	2	6	8
Bead Block Compressible Microspheres	1	5	6
	2	4	6

LC Bead/Bead Block product configurations.

## 5 Similarities and Differences to Predicates

The intended use of LC Bead/Bead Block and the predicate device are the same and unchanged. Biocompatibles UK Ltd intend to market LC Bead with an additional SKU in the size range of 70-150µm. Only minor process modifications were made to allow for the production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

## 6 Physical Properties and Characteristics

LC Bead & Bead Block are preformed, soft, deformable microspheres which consist of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Compressed beads will recover to their original size (e.g. when compressed passing through a catheter, the beads will return to their original size after exiting the catheter). This Pre-Market notification adds the size range of 70-150µm for the blue dyed version of LC Bead. Both products are supplied in a variety of size ranges as follows:

Product Code	Size Range (µm)	Quantity Bead Block (mL)	Quantity PBS (mL)
EB1S103	100-300	1	5
EB1S305	300-500	1	5
EB1S507	500-700	1	5
EB1S709	700-900	1	5
EB1S912	900-1200	1	5
EB2S103	100-300	2	4
EB2S305	300-500	2	4
EB2S507	500-700	2	4
EB2S709	700-900	2	4
EB2S912	900-1200	2	4

Bead Block available size ranges

Product Code	Size Range (µm)	Quantity LC Bead (mL)	Quantity PBS (mL)
UB1V103	100-300	1	7
UB1V305	300-500	1	7
UB1V507	500-700	1	7
UB1V709	700-900	1	7
UB1V912	900-1200	1	7
UB2V103	100-300	2	6
UB2V305	300-500	2	6
UB2V507	500-700	2	6
UB2V709	700-900	2	6
UB2V912	900-1200	2	6

LC Bead (undyed) available size ranges

Product Code	Size Range ( $\mu\text{m}$ )	Quantity LC Bead (mL)	Quantity PBS (mL)
VE110GS	70-150	1	7
VE210GS	100-300	1	7
VE410GS	300-500	1	7
VE610GS	500-700	1	7
VE810GS	700-900	1	7
VE1010GS	900-1200	1	7
VE120GS	70-150	2	6
VE220GS	100-300	2	6
VE420GS	300-500	2	6
VE620GS	500-700	2	6
VE820GS	700-900	2	6
VE1020GS	900-1200	2	6

LC Bead (dyed) available size ranges

### 6.1 Differences between LC Bead and BeadBlock

Bead Block is dyed blue using an FDA approved dye (used in contact lenses) to aid in the visualization of the microspheres in the delivery syringe (LC Bead are available as blue and in natural color). Bead Block is provided in a polycarbonate sterile syringe, LC Bead is provided in a sterile glass vial. The primary difference between LC Bead and Bead Block products, aside from the packaging relates to the degree of functionalisation of the macromer and the ratios of initiators used in the reaction which results in differences in the degree of crosslinking of the polymer in the microspheres.

This pre-market notification relates only to the addition of a size fraction for LC Bead in the range of 70-150 $\mu\text{m}$  which is a subgroup of the currently marketed LC Bead 100-300 $\mu\text{m}$  product and the 70-150 $\mu\text{m}$  size specification falls within that of the cleared 100-300  $\mu\text{m}$  LC Bead size range. Please refer to Section 8: In-Vitro testing for further product characterization information. There is no change to the product supplied under the Bead Block trade name.

## 7 Summary of Non-clinical data

LC Bead and BeadBlock have been tested in pre-clinical models for biocompatibility and safety in accordance with the FDA Guidance for Industry and staff; Class II Special Controls Guidance Document: vascular and Neurovascular Embolization Devices.

## 7.1 Tests of Biocompatibility

Tests for biocompatibility were conducted in accordance with ISO 10993 parts 1, 3, 4, 6, 10 and 11 (listed in section 9), the products conform to the relevant requirements of these standards.

Biocompatibility Test	Pass/Fail
Genotoxicity: In Vitro Chromosomal Aberration Study in Mammalian Cells	Pass
Mouse Bone Marrow Micronucleus Study	Pass
In Vitro Hemolysis Study (Modified ASTM-Direct Contact Method)	Pass
ISO Muscle Implantation Study in the Rabbit	Pass
Cytotoxicity Study using the ISO Elution Method	Pass
ISO Sensitization Study in the Guinea Pig	Pass
ISO Acute Intracutaneous Reactivity Study in the Rabbit	Pass
Chronic Toxicity Study in the Rat following Subcutaneous Implantation (13 weeks)	Pass
Subchronic Intravenous Toxicity Study in the Rat (14 day, saline extract)	Pass
Genotoxicity: Bacterial Reverse Mutation Study	Pass
ISO Acute Systemic Toxicity Study in the Mouse (liquid/chemical)	Pass
ISO Surgical Muscle Implantation in the Rabbit (26 weeks)	Pass

## 7.2 Pre-clinical testing in a large animal model

### Summary of the Evaluation of LC Bead (formerly Gelspheres) Embolic Agent in a Swine Embolization Model

The purpose of this study was to evaluate, characterize and compare the performance of LC Bead Embolic Agent (n=36) and Embosphere® microspheres (n=36) in a swine bilateral partial renal artery embolization model in order to assess the ability of these agents to occlude the vessel.

The primary outcomes for this study were assessment of:

- (1) recanalization of the vessels, and,
- (2) local and systemic foreign body tissue reactions.

The secondary outcomes were assessment of:

- (1) ease of delivery of the embolic agent,
- (2) the occurrence of blood vessel rupture
- (3) non-target embolization/device migration.

LC Bead Embolic Agent and Embospheres microspheres performed in a substantially equivalent manner at 2, 7 and 28 days for all parameters except recanalization, where LC Bead appears to

have an advantage of having a more durable embolization effect. The tissue reaction for both LC Bead and Embospheres was very mild and was essentially the same. Both embolic agents delivered easily, but Embospheres had six cases of catheter clogging out of 36 cases. There was only one case of catheter clogging with LC Bead. There were no incidents of blood vessel rupture during the embolization procedures. There was one case of unexplained non-target embolization with Embospheres and none with LC Bead. Alternatively, there was one potential case of device migration with LC Bead and none with Embospheres.

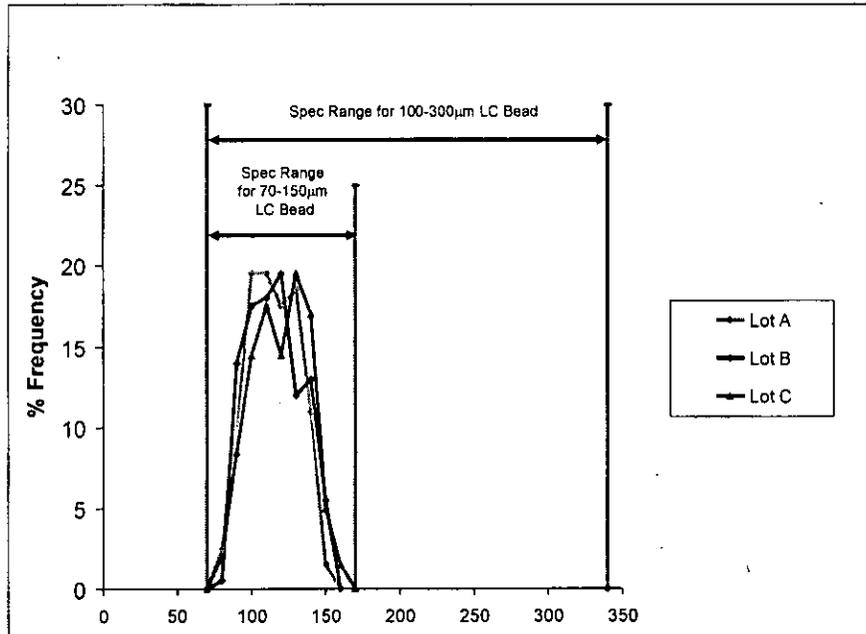
## 8 Summary of In-Vitro testing

Both LC Bead and Bead Block have been extensively tested and subject to product and process validation and verification testing. A summary of key characteristics for which test data has been provided in this 510K, are described in this section.

### 8.1 Size distribution

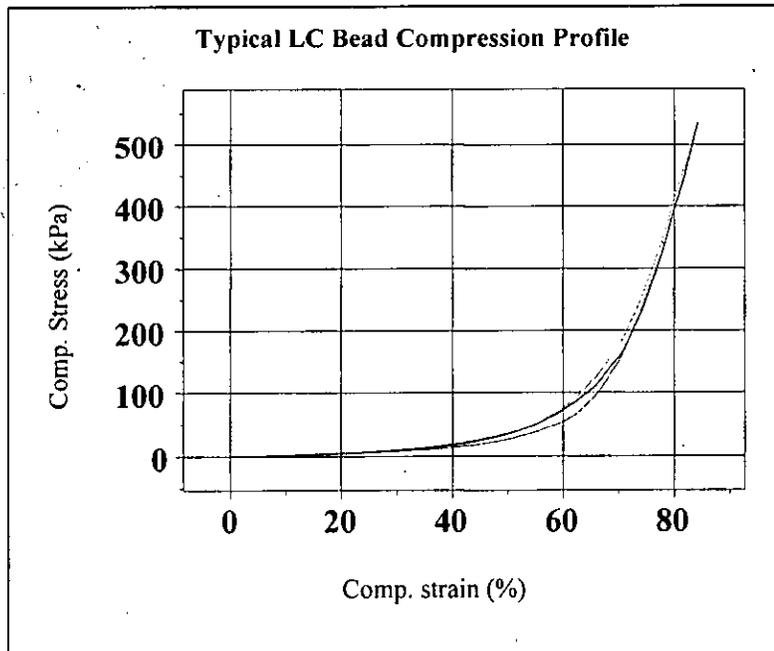
Data was provided in this pre market notification regarding the verification and validation of the new size range of LC Bead. The table and illustration below provide the results of these tests and demonstrate that all product met specification with respect to bead size.

Product	Sizing Specification <5% outside the product specification	Fibres Specification <0.5% of particles
Current LC Bead 100-300µm	Pass	Pass
LC Bead 70-150µm	Pass	Pass



## 8.2 Compressibility

LC Bead has been tested to assure it meets its specifications for compression modulus. The figure below provides an illustration of the test results presented in prior pre-market notifications where the product was tested in accordance with a written protocol "Compression Modulus Measured by Instron"



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### 8.3 Catheter Delivery

Catheter delivery characteristics have been tested in accordance with a written protocol to assure performance with typical microcatheters. The table below provides a summary of the test results for the current marketed LC Bead product and the 70-150µm size fraction.

Catheter I.D. (in/µm)	microcatheter	LC Bead Bead Block Model	Compatible LC Bead/Bead Block Size(s)					
			70-150	100-300	300-500	500-700	700-900	900-1200
0.024/610 and up	5Fr. AngioDynamics	S Series						
		V Series						
	FasTracker® 325	S Series						
	5Fr. AngioDynamics	V Series						
0.021/540	FasTracker® 18	S Series						
	Cook 3.0 Fr.	V Series						
0.016/420	Prowler® 14	S Series						
		V Series						
0.022/570	2.4Fr Progreat™ Terumo	S Series						
		V Series						
	Spinnaker Elite1.8	S Series						
		V Series						

### 8.4 Other tests

Additional bead characterization data has been provided in this pre-market notification with respect to other attributes of the device. A summary of this additional test data is provided below.

SB

Test	Pass/Fail
Residual starting materials	Pass
Residual solvents	Pass
Product visual inspection	Pass
Product catheter deliverability	Pass
Time to Suspension Studies	Pass
Bead aspiration from vial	Pass
Levels of broken or bead fragments after catheter delivery	Pass
Bead sizing	Pass
pH Testing	Pass

## 9 Performance Standards

LC Bead/Bead Block Compressible Microspheres meet the following Performance Standards:

- Guidance For Industry; 2004: FDA Guidance for Neurological Embolization Products.
- ISO/EN 10993-1; 1997 Biological Evaluation of Medical Devices, Part I: Evaluation and Testing.
- ISO/EN 10993-3; 1993 Biological Evaluation of Medical Devices, Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity.
- ISO/EN 10993-4; 1993 Biological Evaluation of Medical Devices, Part 4: Selection of tests for interaction with blood.
- ISO/EN 10993-6; 1995 Biological Evaluation of Medical Devices, Part 6: Test for local effects after implantation.
- ISO/EN 10993-10; 1995 Biological Evaluation of Medical Devices, Part 10: Tests for Irritation and Sensitization.
- ISO/EN 10993-11; 1993 Biological Evaluation of Medical Devices, Part 11: Tests for Systemic Toxicity.
- ISO/EN 11607; 1997 – Packaging for terminally sterilized products.
- AAMI 17665-1; 2006 – Sterilization of Health Care Products Requirements for validation and routine control – Industrial moist heat sterilization 2<sup>nd</sup> edition.
- ANSI/AAMI/ISO 14937; 2009 – Sterilization of Health Care Products Characterization of a Sterilizing Agent and the Development, Validation and Routine Control of a Sterilization Process for Medical Devices.
- ISO 14971; 2007 – Medical Devices – Application of Risk Management

## 9.1 Conclusion

There are more similarities than differences between the predicate device and the LC Bead/Bead Block products. This Premarket Notification explains the minor revisions made to the manufacturing process to enable production of the additional smaller diameter SKU which is a subset of the currently cleared 100-300 LC Bead product. The primary packaging, indications for use, specifications and chemistry are unchanged from K033761/K042231/K083091. The predicate device and LC Bead/Bead Block products have the same intended use, warnings and contraindications. The predicate device and LC Bead/Bead Block products are identical other than the added size range, in design, and unchanged from the predicate device. When used in accordance with the instructions for use, by qualified personnel, the LC Bead/Bead Block products are safe and effective, as indicated, for the intended use.





**COVER SHEET MEMORANDUM**

From: Reviewer Name Jeffrey Toy  
Subject: 510(k) Number K094018  
To: The Record

Please list CTS decision code TH

- Refused to accept (Note: this is considered the first review cycle, See Screening Checklist [http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0\\_5631/Screening%20Checklist%207%202%2007.doc](http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_5631/Screening%20Checklist%207%202%2007.doc))
- Hold (Additional Information or Telephone Hold).
- Final Decision (SE, SE with Limitations, NSE, Withdrawn, etc.).

Please complete the following for a final clearance decision (i.e., SE, SE with Limitations, etc.):		YES	NO
Indications for Use Page	Attach IFU		
510(k) Summary /510(k) Statement	Attach Summary		
Truthful and Accurate Statement.	Must be present for a Final Decision		
Is the device Class III?			
If yes, does firm include Class III Summary?	Must be present for a Final Decision		
Does firm reference standards? (If yes, please attach form from <a href="http://www.fda.gov/opacom/morechoices/fdaforms/FDA-3654.pdf">http://www.fda.gov/opacom/morechoices/fdaforms/FDA-3654.pdf</a> )			
Is this a combination product? (Please specify category _____, see <a href="http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_413b/COMBINATION%20PRODUCT%20ALGORITHM%20(REVISED%203-12-03).DOC">http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPremarketNotification510kProgram/0_413b/COMBINATION%20PRODUCT%20ALGORITHM%20(REVISED%203-12-03).DOC</a> )			
Is this a reprocessed single use device? (Guidance for Industry and FDA Staff – MDUFMA - Validation Data in 510(k)s for Reprocessed Single-Use Medical Devices, <a href="http://www.fda.gov/cdrh/ode/guidance/1216.html">http://www.fda.gov/cdrh/ode/guidance/1216.html</a> )			
Is this device intended for pediatric use only?			
Is this a prescription device? (If both prescription & OTC, check both boxes.)			
Did the application include a completed FORM FDA 3674, Certification with Requirements of ClinicalTrials.gov Data Bank?			
Is clinical data necessary to support the review of this 510(k)? Did the application include a completed FORM FDA 3674, Certification with Requirements of ClinicalTrials.gov Data Bank? (If not, then applicant must be contacted to obtain completed form.)			
Does this device include an Animal Tissue Source?			
All Pediatric Patients age <=21			
Neonate/Newborn (Birth to 28 days)			
Infant (29 days -< 2 years old)			
Child (2 years -< 12 years old)			
Adolescent (12 years -< 18 years old)			
Transitional Adolescent A (18 - <21 years old) Special considerations are being given to this group, different from adults age ≥ 21 (different device design or testing, different protocol procedures, etc.)			













**K094018**

Date: **January 26, 2009**  
Reviewer: **Jeffrey Toy, Ph.D.** *JT*  
Division/Branch: **DOED/NNDB**  
Device Name: **Biocompatible UK Ltd LC Bead/Bead Block™ Compressible Microspheres**  
Classification: **Class II** Name: **Neurovascular Embolization Device**  
CFR **882.5950,** Procode: **HCG**  
**870.3300** KRD

**To:** THE FILE

**RE:** DOCUMENT NUMBER K093919

## RECOMMENDATION: ADDITIONAL INFORMATION

This 510(k) submission contains information/data on modifications made to the SUBMITTER'S own Class II, Class III or Class I devices requiring 510(k). The following items are present and acceptable (delete/add items as necessary):

1. The name and 510(k) number of the SUBMITTER'S previously cleared device. (For a preamendments device, a statement to this effect has been provided.)

K033761 GelSphere/Bead Block™ Compressible Microspheres  
K042231 GelSphere/Bead Block™ Compressible Microspheres  
K083091 LC Bead™/Bead Block™ Compressible Microspheres

2. Submitter's statement that the **INDICATION/INTENDED USE** of the modified device as described in its labeling **HAS NOT CHANGED** along with the proposed labeling which includes instructions for use, package labeling, and, if available, advertisements or promotional materials (labeling changes are permitted as long as they do not affect the intended use).

The LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular and arteriovenous malformations.

3. A description of the device **MODIFICATION(S)**, including clearly labeled diagrams, engineering drawings, photographs, user's and/or service manuals in sufficient detail to demonstrate that the **FUNDAMENTAL SCIENTIFIC TECHNOLOGY** of the modified device **has not changed**.

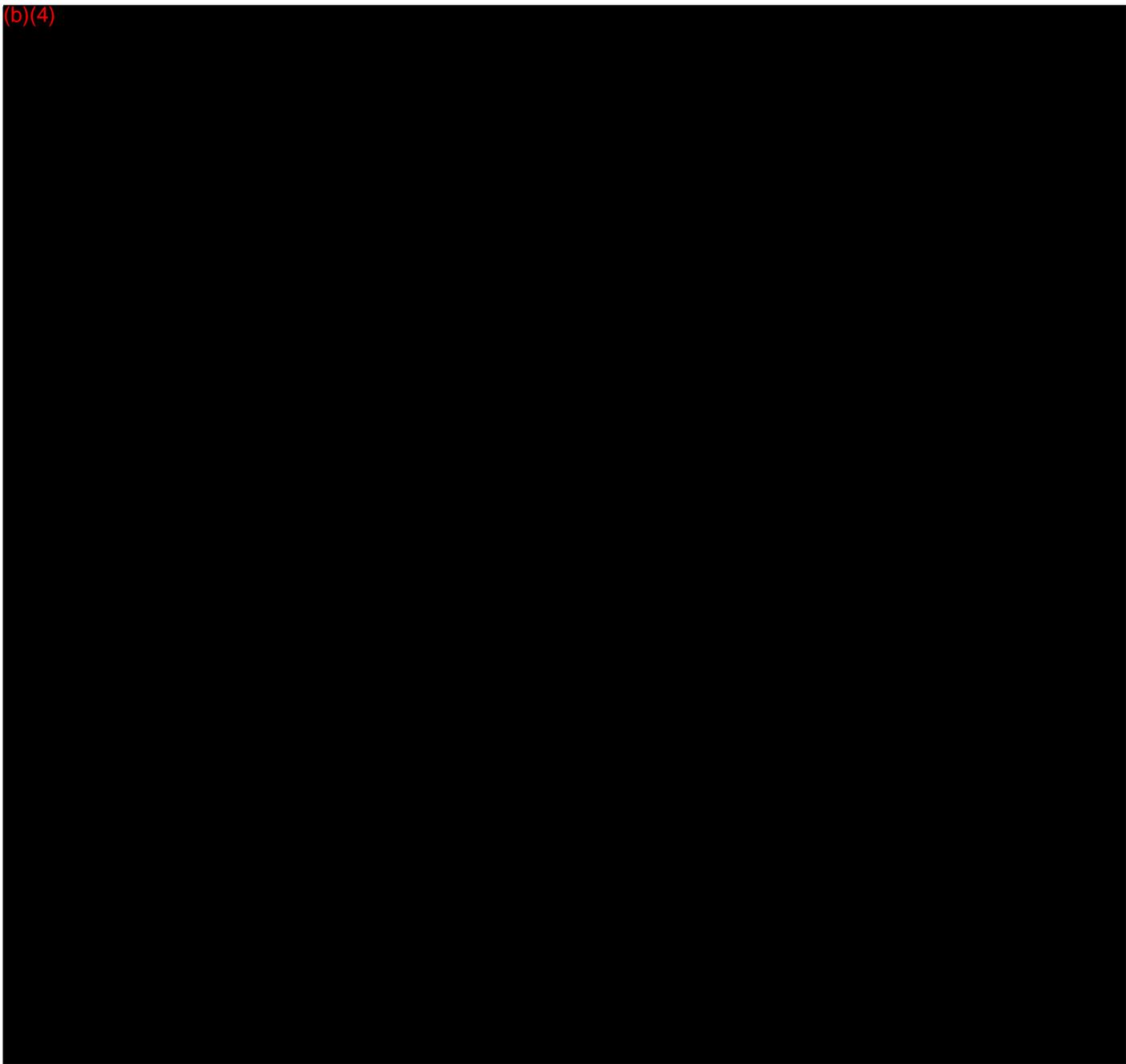
Biocompatibles UK Ltd intend to market LC Bead with an additional **size range of 70-150µm** (currently cleared size ranges include 100-300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ). Only minor process modifications were made to allow for the production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

### General Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range. LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter At the time of use, LC Bead/Bead

Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

REVIEWER COMMENT: Stampfl et al (2009) noted that particles in general showed a deeper distribution than expected in a minipig kidney arterial occlusion model and Bead Block particles specifically showed a significantly deeper distribution than similarly sized particles. With smaller diameter beads it is possible for the beads to enter the venous side of the circulation and cause embolization in other organs. Maluccio et al saw 8% non-target embolization when using 40-120µm Embospheres. Given the concern with non-target embolization in smaller particles and Bead Block particles tendency to penetrate deeper, an animal study should be conducted to evaluate the penetration and distribution properties of the smaller beads.



4. **Comparison Information** (similarities and differences) to applicant's legally marketed predicate device including, labeling, intended use, physical characteristics, and

Biocompatibles UK Ltd intend to market LC Bead with an additional size range of 70-150  $\mu\text{m}$  (currently cleared size ranges include 100–300  $\mu\text{m}$ , 300-500  $\mu\text{m}$ , 500-700  $\mu\text{m}$ , 700-900  $\mu\text{m}$ , and 900-1200  $\mu\text{m}$  ). (b)(4)

(b)(4) Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

5. **A Design Control Activities Summary** which includes:
- a) Identification of Risk Analysis method(s) used to assess the impact of the modification on the device and its components, and the results of the analysis
  - b) Based on the Risk Analysis, an identification of the verification and/or validation activities required, including methods or tests used and acceptance criteria to be applied
  - c) A declaration of conformity with design controls. The declaration of conformity should include:
    - i) A statement signed by the individual responsible, that, as required by the risk analysis, all verification and validation activities were performed by the designated individual(s) and the results demonstrated that the predetermined acceptance criteria were met, and
    - ii) A statement signed by the individual responsible, that the manufacturing facility is in conformance with design control procedure requirements as specified in 21 CFR 820.30 and the records are available for review.

Kristen Bowsher reviewed the design control section and determined that it was adequate. Please see her attached engineering review.

Biocompatible provided a signed declaration of conformity with design controls that included items i) and ii) (above). The document was signed by Alistair Taylor, Biocompatible's Director of Regulatory Affairs (17 of 154)

6. **A Truthful and Accurate Statement, a 510(k) Summary or Statement and the Indications for Use Enclosure (and Class III Summary for Class III devices).**

On page 16 of 154, Biocompatible provided a signed truthful and accurate statement. The document was signed by Alistair Taylor, Biocompatible's Director of Regulatory Affairs.

On page 15 and 18-21 of 154, MicroVention provided a 510k summary of safety and effectiveness sheet. I will review the 510k summary after we received the additional information on the device.

On page 13 of 35, MicroVention provided the Indication for Use enclosure and the IFU statement is identical to the predicate IFU statement.

The labeling for this modified subject device has been reviewed to verify that the indication/intended use for the device is unaffected by the modification. In addition, the submitter's description of the particular modification(s) and the comparative information between the modified and unmodified devices demonstrate that the fundamental scientific technology has not changed. The submitter has provided the design control information as specified in The New 510(k) Paradigm and on this basis, I recommend the device be determined substantially equivalent to the previously cleared (or their preamendment) device.

(Reviewer's Signature)

(Date)

Comments

revised:8/1/03

"SUBSTANTIAL EQUIVALENCE" (SE) DECISION MAKING DOCUMENTATION

	Yes	No
1. Same Indication Statement?	X	If YES = Go To 3
2. Do Differences Alter The Effect Or Raise New Issues of Safety Or Effectiveness?		If YES = Stop NSE
3. Same Technological Characteristics?	X	If YES = Go To 5
4. Could The New Characteristics Affect Safety Or Effectiveness?		If YES = Go To 6
5. Descriptive Characteristics Precise Enough?		X If NO = Go To 8 If YES = Stop SE
6. New Types Of Safety Or Effectiveness Questions?		If YES = Stop NSE
7. Accepted Scientific Methods Exist?		If NO = Stop NSE
8. Performance Data Available?		X If NO = Request Data
9. Data Demonstrate Equivalence?		Final Decision:

Note: See [http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPreMarketNotification510kProgram/0\\_4148/FLOWCHART%20DECISION%20TREE%20.DOC](http://eroom.fda.gov/eRoomReq/Files/CDRH3/CDRHPreMarketNotification510kProgram/0_4148/FLOWCHART%20DECISION%20TREE%20.DOC) for Flowchart to assist in decision-making process. Please complete the following table and answer the corresponding questions. "Yes" responses to questions 2, 4, 6, and 9, and every "no" response requires an explanation.

1. Explain how the new indication differs from the predicate device's indication:
2. Explain why there is or is not a new effect or safety or effectiveness issue:
3. Describe the new technological characteristics:

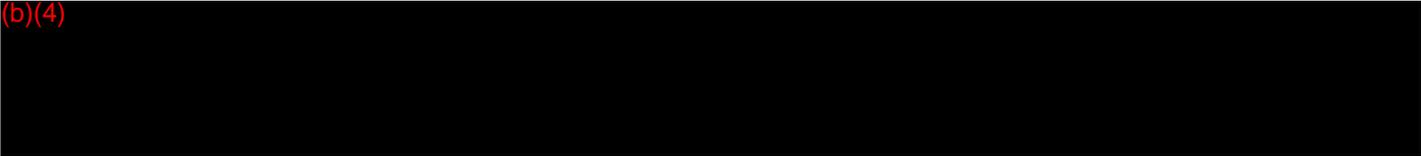
(b)(4)

4. Explain how new characteristics could or could not affect safety or effectiveness:
5. Explain how descriptive characteristics are not precise enough:

(b)(4)

6. Explain new types of safety or effectiveness question(s) raised or why the question(s) are not new:
7. Explain why existing scientific methods can not be used:

(b)(4)



9. Explain how the performance data demonstrates that the device is or is not substantially equivalent:

Date: January 22, 2010

From: Myra Smith, Microbiologist 

To: The Record

Subject: K094018– Microbiology/Sterilization review

Re: Biocompatibles UK Ltd - LC Bead/Bead Block Compressible  
Microspheres.

Purpose of Submission

This 510(k) Special submission contains information/data on modifications made to the Biocompatibles own previously cleared predicate Class II device.

Predicate Devices

K033761	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K042231	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K083091	LC Bead™ / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.

Indications for Use

*LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations*

Indications for Use/Intended Use of the modified device as described in its labeling has not changed from the predicate device.

Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range. LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1.

Biocompatibles UK Ltd intend to market LC Bead with an additional size range of 70-150 µm (currently cleared size ranges include 100–300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm).

Comparison with Predicate Device - (similarities and differences) to applicant's legally marketed predicate device

Other than the additional size range, there are no differences when comparing the modified LC Bead/Bead Block to the predicate device.

510k Sterility Template

	YES	NO
<b>1. Sterilant:</b> <b>a. Sterilization method</b> description (e.g., Steam, EtO, Radiation): <b>b. Dose</b> , for radiation (e.g., 25 – 50 kGy): <b>c. Sterilant residuals</b> remaining on the device: For EO, the maximum levels of residuals of EO and ethylene chlorhydrin that remain on the device (note: not to include ethylene glycol residual level because the recognized standard, "ANSI/AAMI/ISO 10993-7:1995 Biological Evaluation of Medical Devices – Part 7: Ethylene Oxide sterilization residuals," does not include measurement of ethylene glycol residuals);	X	
<b>2. A description of the Validation Method for the sterilization cycle (not data):</b> (Full citation of an FDA recognized standard is recommended (e.g., ANSI/AAMI/ISO 11135-1:2007, Sterilization of health care products - Ethylene oxide - Part 1: Requirements for the development, validation, and routine control of a sterilization process for medical devices.))	X	
<b>3. Sterility assurance level (SAL):</b> (e.g., 10 <sup>-6</sup> for all devices (except 10 <sup>-3</sup> for devices that contact intact skin))	X	
<b>4. Is it labeled "Pyrogen Free"?</b>  If so, a description of the method: (e.g., LAL ( <i>Limulus</i> Amebocyte Lysate test))	X	
<b>5. A description of the packaging</b> (not including package integrity test data):	X	

Sterilization Validation

The device is supplied sterile and is for single use. There are no manufacturing differences that would impact the sterilization cycle validated for the predicate devices. Device packaging and the sterilization cycle using moist heat remain unchanged from the predicate device. to achieve a Sterility Assurance level (SAL) of 10<sup>-6</sup>. Validation is accordance with AAMI/ANIS/ISO 17665:1 Sterilization of health care products. Requirements for validation and routine control - Industrial moist heat sterilization using an overkill cycle approach. Sterilization validation for the predicate device is applicable.

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Although not the subject of this premarket application, a summary for revalidation of the routine cycle due to a change in contract sterilizer was included in the submission and did not raise new questions of safety and efficacy.

Recommendation - No further validation necessary due to device modification of the predicate device.

#### Device Packaging

Bead Block – 20 ml polycarbonate syringes sealed within a polycarbonate tray with tyvek sterile barrier.

LC Bead – 10ml glass vials with rubber stopper and an aluminum crimped cap. Single

Pouch – Tyvek pouch (polyethylene)

Outer Cartons – Cardboard

Recommendation – Same packaging as predicate device. Packaging materials are compatible with moist heat sterilization. No further validation necessary due to device modification of the predicate device.

#### Pyrogenicity

LC Bead/Bead Block are labeled as 'non-pyrogenic'. Limulus Amebocyte Lysate Endotoxin testing is performed to meet the 0.06 EU/ML requirement as outlined in FDA 1987 Guidance Document: Guideline on Validation of Limulus Amebocyte Lysate Test as an End Product Endotoxin Test for Human and Animal Parenteral Drugs, Biological Products and Medical Devices.

Recommendation – No further validation necessary due to device modification of the predicate device.

#### Expiration Dating

Package integrity testing to establish shelf-life should include evaluations of functional testing and of the integrity of the package to maintain the sterile barrier under simulated conditions of shipping and handling and throughout shelf-life. The sponsor indicates that a 48 month shelf life in the designated packaging has been established. Although the submission does not specify what testing was performed to establish expirations dating of the package to maintain the sterile barrier for the predicate device, no further evaluation of package integrity is necessary for the device modification proposed in this Special 510k.

Recommendation – No further validation necessary due to the device modification of the predicate device.

Conclusion/Recommendation

A determination of Substantial Equivalence (SE) is recommended from a microbiology standpoint.

**SPECIAL 510(k): Device Modification  
ODE Review Memorandum**

From: Kristen Bowsher, Ph.D. *KAB*  
To: Jeff Toy, Ph.D. (Lead Reviewer, DONED/NNDB)  
RE: **K094018**

Device: **Biocompatibles UK Ltd - LC Bead/Bead Block Compressible Microspheres.**

**RECOMMENDATION**

From an engineering perspective I recommend the following additional information be requested from the sponsor:

(b)(4)

**Review Scope**

This review will cover the engineering aspects of the device.

**Review**

This 510(k) submission contains information/data on modifications made to the SUBMITTER'S own Class II, Class III or Class I devices requiring 510(k). The following items are present and acceptable:

1. The name and 510(k) number of the SUBMITTER'S previously cleared device.

LC Bead/Bead Block Compressible Microspheres. Predicate devices include:

Predicate 510(k) #	Predicate Device Name	Predicate Manufacturer
K033761	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K042231	GelSpheres / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.
K083091	LC Bead™ / Bead Block™ Compressible Microspheres	Biocompatibles UK Ltd.

2. Submitter's statement that the **INDICATION/INTENDED USE** of the modified device as described in its labeling **HAS NOT CHANGED** along with the proposed labeling which includes instructions for use, package labeling, and, if available, advertisements or promotional materials (labeling changes are permitted as long as they do not affect the intended use).

Indications for Use: "LC Bead Microspheres & Bead Block Compressible Microspheres is intended for embolization of hypervascular tumors and arteriovenous malformations."

3. A description of the device **MODIFICATION(S)**, including clearly labeled diagrams, engineering drawings, photographs, user's and/or service manuals in sufficient detail to demonstrate that the **FUNDAMENTAL SCIENTIFIC TECHNOLOGY** of the modified device **has not changed**.

Biocompatibles UK Ltd intend to market LC Bead with an additional **size range of 70-150µm** (currently cleared size ranges include 100–300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ). Only minor process modifications were made to allow for the production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

#### General Device Description

LC Bead/Bead Block are preformed, soft, deformable microspheres that occlude arteries for the purpose of blocking the blood flow to a target tissue, such as a hypervascular tumor or arteriovenous malformations (AVM's). LC Bead/Bead Block consists of a macromer derived from polyvinyl alcohol (PVA). The fully polymerized microsphere is approximately 90% water and is compressible to approximately 20-30% by diameter. Bead Block is dyed blue (LC Bead are available as blue and in natural color) to aid in the visualization of the microspheres in the delivery syringe. The microspheres can be delivered through typical microcatheters in the 1.8-5Fr range. LC Bead is supplied sterile and packaged in sealed glass vials. Bead Block is supplied sterile and packaged in polycarbonate syringes. The product configurations are described in table 3.1. LC Bead/Bead Block are supplied in several unit sizes covering the range from 100-1200µm diameter. At the time of use, LC Bead/Bead Block is mixed with a nonionic contrast agent, e.g. Omnipaque™, to make a 30-50% by weight solution.

4. **Comparison Information** (similarities and differences) to applicant's legally marketed predicate device including, labeling, intended use and physical characteristics.

Biocompatibles UK Ltd intend to market LC Bead with an additional **size range of 70-150 µm** (currently cleared size ranges include 100–300 µm, 300-500 µm, 500-700 µm, 700-900 µm, and 900-1200 µm. ). Only minor process modifications were made to allow for the production of this size range. Other than the additional size range, there are no differences when comparing LC Bead/Bead Block to the predicate device.

#### Reviewer Comments

Although the size range of the requested LC Bead (i.e., 70-150 µm) is smaller than the sponsor's own predicate devices it is in the range of legally marketed PVA microspheres. I have identified the following 510(k)s (just as a sampling and there are probably additional cleared 510(k)s) that include PVA particles that are in the range of the requested particle size:

- K001678 – Surgica Corp. PVA particles include 45-90 µm size
- K061790 – Protein Polymer Tech., Inc. particles include 45-90 µm size
- K042297 – Acta Vascular Systems, Inc. particles include 50-150 µm size
- K052742 – Biosphere Medical, Inc. particles include 50-100 µm size
- K030966 – Boston Scientific particles include 45-150 µm size

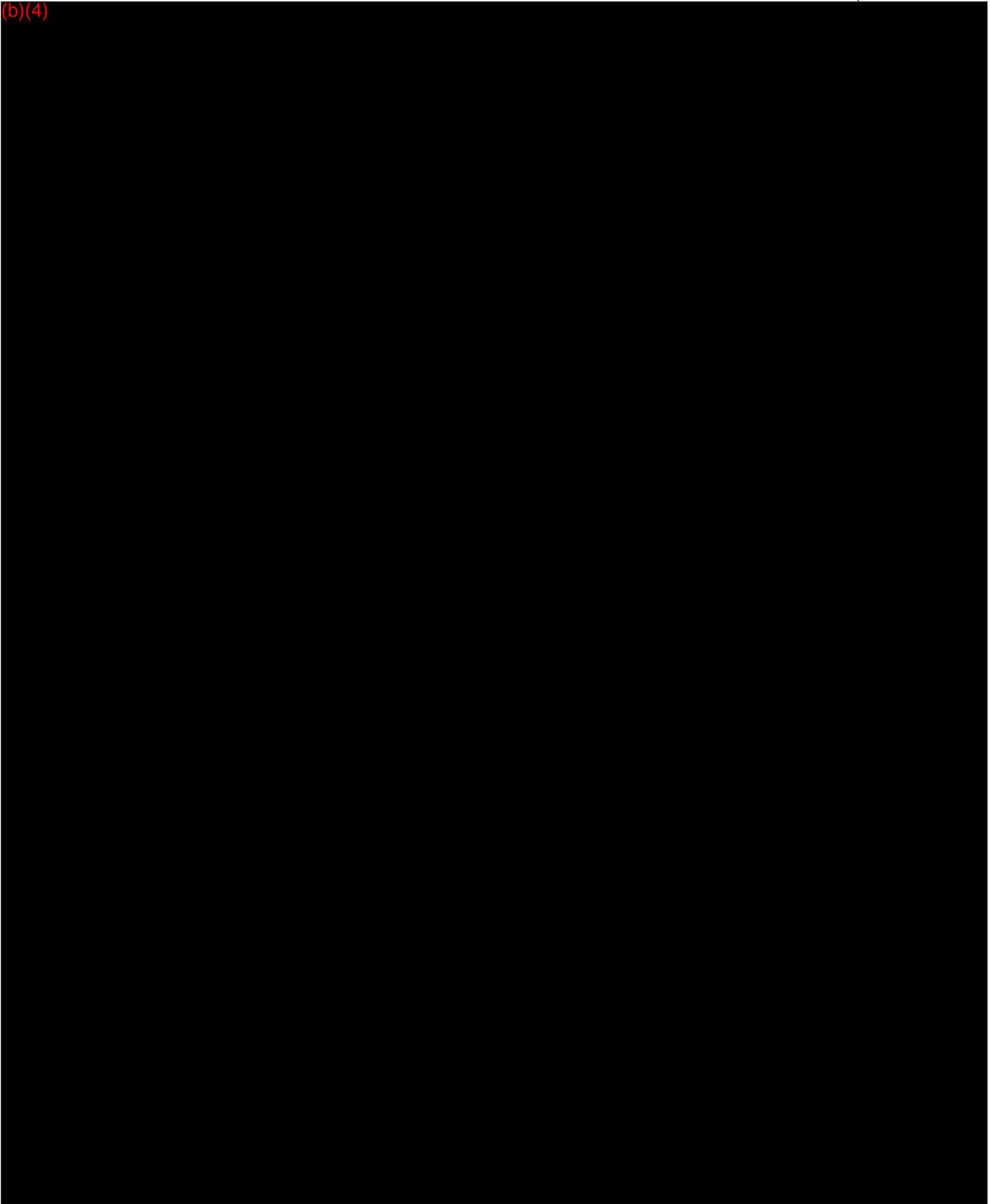
Thus, the particle size requested is in the range of legally marketed predicate devices.

5. **A Design Control Activities Summary** which includes:
- a) Identification of Risk Analysis method(s) used to assess the impact of the modification on the device and its components, and the results of the analysis

See Appendix III, page 120.

- b) Based on the Risk Analysis, an identification of the verification and/or validation activities required, including methods or tests used and acceptance criteria to be applied

(b)(4)



Reviewer Comments

The sponsor indicates that the beads passed all of the testing that was performed. (b)(4)

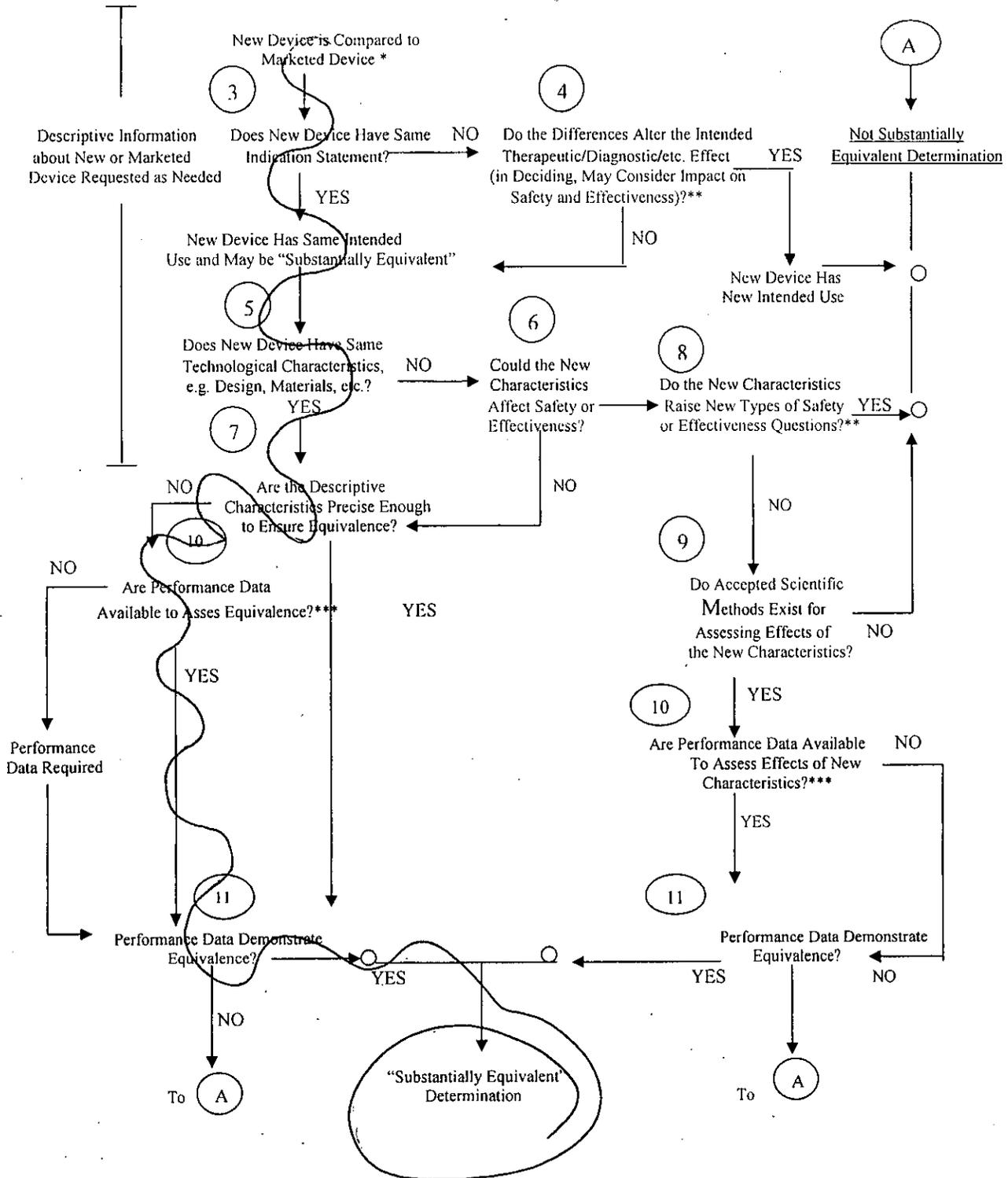
(b)(4)

**RECOMMENDATION**

From an engineering perspective I recommend the following additional information be requested from the sponsor:

The compression modulus is an important characteristic for assessing the physical comparability of your proposed device to legally marketed predicate devices. Therefore, please provide the compression modulus of the 70-150 $\mu$ m LC Beads, compare them to a legally marketed predicate device, and discuss why any differences should not affect the safety and effectiveness of the 70-150 $\mu$ m LC Beads as compared to legally marketed predicate devices. Alternatively, please justify why this characteristic is not important in assessing the safety and effectiveness of the device as compared to legally marketed predicate devices.

### 510(k) "SUBSTANTIAL EQUIVALENCE" DECISION-MAKING PROCESS



- ❖ 510(k) Submissions compare new devices to marketed devices. FDA requests additional information if the relationship between marketed and "predicate" (pre-Amendments or reclassified post-Amendments) devices is unclear.
- ❖❖ This decision is normally based on descriptive information alone, but limited testing information is sometimes required.
- ❖❖❖ Data maybe in the 510(k), other 510(k)s, the Center's classification files, or the literature.

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