U.S. Department of Health & Human Services

Food and Drug Administration

SAVE REQUEST

USER:	(kml)
FOLDER:	K032115 - 437 pages
COMPANY:	POLYGANICS BV (POLYGANICS)
PRODUCT:	CUFF, NERVE (JXI)
SUMMARY:	Product: NEUROLAC NERVE GUIDE MODELS NG01-15/03, NG01-020/03, NG01 025/03, NG01
DATE REQUESTED:	Jun 7, 2016
DATE PRINTED:	Jun 7, 2016
Note:	Printed

K032115

510(k)
Summary of Safety and Effectiveness

Submitter:

Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands
www.polyganics.com

Contact Person:

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Tel : +31 50 588 6588
Fax : +31 50 588 6599
Mobile : +31 653 211 303
E-mail : hak@polyganics.com

Date Prepared:

May 20, 2003

General Provisions:

Trade Name: Neurolac® Nerve guide

Common Name: Nerve guide

Classification Name: Nerve Cuff, 21 CFR 882.5275

Device Classification: Class II

Predicate Devices:

• Neurotube™	Neuroregen L.L.C.	K983007
• NeuroGen™	Integra Life Sciences Corp.	K011168

Performance Standards

For the Nerve Cuff performance, the FDA, under section 514 of the Food, Drug and Cosmetic Act, has not established standards.

Indications for Use

The Neurolac® nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Device Description

Neurolac® is designed to be a flexible and transparent resorbable poly(DL-lactide-co-ε-caprolactone) tube to provide a protective environment for peripheral nerve regeneration after injury and to create a conduit to guide axonal growth across a nerve gap.

Neurolac® nerve guides are provided sterile in Tyvek pouch packages and retainer in a variety of sizes.

Performance Data:

The safety and effectiveness of the Neurolac nerve guides have been demonstrated via data collected from design verification tests and analyses. The design verification testing consisted of the following:

- In vitro suture retention testing
- In vitro degradation testing
- In vivo nerve function recovery

Summary of Substantial Equivalence

The design, fundamental technology and intended use (safety and efficacy) featured with the Neurolac® Nerve Guide are substantially equivalent to those featured with the competitor devices Neurotube™ (ref. 510(k) 983007; Neuroregen L.L.C.) and the NeuroGen™ Nerve Guide (ref. 510(k) 011168; Integra Life Sciences Corporation).

Biocompatibility, mechanical and physical property testing, in vitro degradation testing, and performance testing in an animal model provide reasonable scientific evidence that Neurolac® nerve guide is substantially equivalent to the predicate devices. Evaluation of the Polyganics Neurolac® Nerve guide based on biocompatibility testing, animal tests, results from literature and the comparison of the Neurolac® nerve guide with its predicate devices, shows that the Neurolac® nerve guide is safe for implantation.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

OCT 1 0 2003

Jan Bart Hak, Ph.D.
Manager, Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands

Re: K032115
Trade/Device Name: Neurolac® Nerve Guide
Regulation Number: 21 CFR 882.5275
Regulation Name: Nerve cuff
Regulatory Class: II
Product Code: JXI
Dated: July 3, 2003
Received: July 17, 2003

Dear Dr. Hak:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

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

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of Compliance at (301) 594-4659. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/dsma/dsmamain.html

Sincerely yours,

Miriam C. Provost

for Celia M. Witten, Ph.D., M.D.
Director
Division of General, Restorative
and Neurological Devices
Office of Device Evaluation
Center for Devices and Radiological Health

Enclosure

Indications for Use Form

510(k) Number: K032115

Device Name: **Neurolac® Nerve Guide**

Indications for Use:

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

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

(Optional Format 1-2-96)

_____
(Division Sign-Off)

510(k) Number _____

Miriam C. Provost
(Division Sign-Off)
Division of General, Restorative and Neurological Devices

510(k) Number K032115

K032115/A1

POLYGANICS
Polymeric innovations in tissue recovery

Polyganics BV
L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

Telephone (31) 50 588 65 88
Telefax (+31) 50 588 65 99
E-mail mail@polyganics.com
Internet www.polyganics.com

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

2003 AUG -4 P 2:30

Your ref. : 510k# K032115
Our ref. : Neurolac Nerve guide
Subject : Correspondence address

Groningen, July 30, 2003

Dear Mrs. Shulman,

In relation to the premarket notification of our product Neurolac nerve guide with the 510(k) number K032115, we have noted that you use our US agent's address for correspondence.

I would greatly appreciate if it would be possible to send any future correspondence directly to me so that we can address any issue timely and efficiently. Our address is (as indicated on the submission cover sheet):

Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands

Tel: +31 50 588 6588
Fax: +31 50 588 6599
E-mail: hak@polyganics.com

Sincerely yours,

Jan Bart Hak
Manager Clinical and Regulatory Affairs

SKS-8 17

Bank account
ABN AMRO Groningen 51.35.29.195
Commercial Reg. No. 02067151
VAT No. NL80.85.30.525.B01

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service
Food and Drug Administration

Memorandum

Date: 10/22/03

From: DMC (HFZ-401)

Subject: Premarket Notification Number(s): K032115/A2

To: Division Director: NE / DGRND

The attached information has been received by the 510(k) DMC on the above referenced 510(k) submission(s). Since a final decision has been rendered, this record is officially closed.

Please review the attached document and return it to the DMC, with one of the statements checked below.

X Information does not change the status of the 510(k); no other action required by the DMC; please add to image file. (Prepare K-25) THIS DOES NOT APPLY TO TRANSFER OF OWNERSHIP. PLEASE BRING ANY TRANSFER OF OWNERSHIP TO POS.

_____Additional information requires a new 510(k); however, the information submitted is incomplete; (Noitify company to submit a new 510(k);[Prepare the K30 Letter on the LAN]

X No response necessary (e.g., hard copy of fax for the truthful and accuracy statement, 510(k) statement, change of address, phone number, or fax number).

CLIA CATEGORIZATION refers to laboratory test system devices reviewed by the Division of Clinical Laboratory Devices (HFZ-440

_____Information requires a **CLIA CATEGORIZATION**; the complexity may remain the same as the original 510(k) or may change as a result of the additional information (Prepare a CAT letter)

____Additional information requires a **CLIA CATEGORIZATION**; however, the information submitted is incomplete; (call or fax firm)

_____No response necessary

DHB

This information should be returned to the DMC within 10 working days from the date of this memorandum.

Reviewed by: Daivd B Barbour

Date: 10/23/03

Draft #2 : 9/8/99
Draft #3: 1/3/00
Draft #4: 3/7/03

OCT 23

nmc

1

POLYGANICS

Polymeric innovations in tissue recovery

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K032115/A2

David B. Berkowitz, Ph.D., V.M.D.
Center for Devices and Radiological Health
Food and Drug Administration
9200 Corporate Blvd. HFZ-410
Rockville, MD 20850
USA

Your ref. : K032115
Our ref. : 03-061
Subject : Nerve Cuff, Neurolac

Groningen, Oct 8, 2003

Dear Mr. Berkowitz,

Please find enclosed the hardcopies of the files, which I've sent to you by electronic mail on Oct 8, 2003. This package includes the "510k file" and the instructions for use.

Of the 510k file, page 6, 8, 15, 17, 18 and 32 (this page is part of the 510k summary) are adjusted according to your recommendation.

Yours sincerely,

Jan-Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs

SK'33

2003 OCT 22 P 3:18

Bank account
ABN AMRO Groningen 51.35.29.195
Commercial Reg. No. 02067151
VAT No. NL 80.85.30.525.B01

2

510(k)
PREMARKET NOTIFICATION
TABLE OF CONTENTS

FDA ADMINISTRATIVE FORMS

Premarket Submission Cover Sheet

Indications for Use Form

S

Submission Cover Sheet				
Date of Submission: **July 3, 2003**		FDA Document Number:		
Section A	**Type of Submission**			
PMA o Original Submission o Modules Submission o Amendment o Report o Report Amendment	**PMA Supplement** o Regular o Special o Panel Track o 30-day Supplement o 30-day Notice o 135-day Supplement o Real-time Review o Amendment to PMA Supplement	**PDP** o Presubmission summary o Original PDP o Notice of intent to start clinical trials o Intention to submit Notice of Completion o Notice of Completion o Amendment to PDP o Report	**510(k)** v Original Submission v Traditional o Special o Abbreviated o Additional Information o Traditional o Special o Abbreviated	**Meeting** o Pre-IDE meeting o Pre-PMA meeting o Pre-PDP meeting o 180-day meeting o Other (specify):
IDE o Original Submission o Amendment o Supplement	**Humanitarian Device Exemption** o Original submission o Amendment o Supplement o Report	**Class II Exemption** o Original submission o Additional information	**Evaluation of Automatic Class III Designation** o Original submission o Additional information	**Other Submission** Describe submission:

Section B	**Applicant or Sponsor**		
Company / Institution name: **Polyganics BV**		Establishment registration number: **Not registered.**	
Division name (if applicable): **Not Applicable**		Phone number (include area code): **+31 50 588 6588**	
Street address: **L.J. Zielstraweg 1**		FAX number (include area code): **+31 50 588 6599**	
City: **Groningen**	State/Province: **Groningen**	Country: **The Netherlands**	Zip/Postal Code: **9713-GX**
Contact name: **Jan-Bart Hak**			
Contact title: **Manager Clinical and Regulatory Affairs**		Contact e-mail address: **hak@polyganics.com**	

Section C	**Submission Correspondent (if different from above)**		
Company / Institution name: not applicable		Establishment registration number: not applicable	
Division name (if applicable): not applicable		Phone number (include area code): not applicable	
Street address: not applicable		FAX number (include area code): not applicable	
City: not applicable	State/Province: not applicable	Country: not applicable	Zip/Postal Code: not applicable
Contact name: not applicable			
Contact title: not applicable		Contact e-mail address: not applicable	

Section D1	Reason for Submission – PMA, PDP, or HDE	
o New device o Withdrawal o Additional or expanded indications o Licensing agreement	o Change in design, component, or specifications: o Software o Color Additive o Material o Specifications o Other (specify below):	o Location Change: o Manufacturer o Sterilizer o Packager o Distributor
o Process Change: o Manufacturing o Sterilization o Packaging o Other (specify below):	o Labeling Change: o Indications o Instructions o Performance characteristics o Shelf Life o Trade Name o Other (specify below):	o Report submissions: o Annual or periodic o Post-approval study o Adverse reaction o Device defect o Amendment
o Response to FDA correspondence: o Request for applicant hold o Request for removal of applicant hold o Request for extension o Request to remove or add manufacturing site o Other reason (specify):	o Change in ownership o Change in correspondent	

Section D2	Reason for Submission – IDE	
o New device o Addition of institution o Expansion/extension of study o IRB certification o Request hearing o Request waiver o Termination of Study o Withdrawal of application o Unanticipated adverse effect o Notification of emergency use o Compassionate use request o Treatment IDE o Continuing availability request o Other reason (specify):	o Change in: o Correspondent o Design o Informed Consent o Manufacturer o Manufacturing process o Protocol – feasibility o Protocol – other o Sponsor o Report Submission: o Current investigator o Annual progress o Site waiver limit reached o Final	o Response to FDA letter concerning: o Conditional approval o Deemed approved o Deficient final report o Deficient progress report o Deficient investigator report o Disapproval o Request extension of time to respond to FDA o Request meeting

Section D3	Reason for Submission – 510(k)	
v New device o Additional or expanded indications oother reason (specify)	o Change in technology o Change in design	o Change in materials o Change in manufacturing process

Section E	**Additional Information on 510(k) Submissions**			
Product codes of devices to which substantial equivalence is claimed:				Summary of, or statement concerning, safety and effectiveness data:
1 **JXI**	2	3	4	v 510(k) summary attached o 510(k) statement

Information on devices to which substantial equivalence is claimed:

510(k) Number	Trade or proprietary or model name	Manufacturer
1. #K983007	**Neurotube™**	**Neuroregen L.L.C.**
2. #K011168	**NeuroGen™ Nerve Guide**	**Integra Life Sciences Corp.**

Section F	**Product Information – Applicable to All Applications**
Common or usual or classification name: Nerve Cuff	
Trade or proprietary or model name	Model number
Neurolac® Nerve Guide	**NG01-015/03**
Neurolac® Nerve Guide	**NG01-020/03**
Neurolac® Nerve Guide	**NG01-025/03**
Neurolac® Nerve Guide	**NG01-030/03**

FDA document numbers of all prior related submissions (regardless of outcome):

1 **N.A.**	2	3	4	5	6

Data included in submission: v Laboratory testing v Animal trials o Human trials

Section G	**Product Classification – Applicable to All Applications**	
Product code: **JXI**	C.F.R. section: **21 CFR 882.5275**	Device class: o Class I v **Class II** o Class III o Unclassified
		Device class: o Class I o Class II o Class III o Unclassified
		Device class: o Class I o Class II o Class III o Unclassified

Classification panel: **Neurology (Neurological Therapeutic Devices)**

Indications (from labeling): The Neurolac nerve guide is indicated for the reconstruction of peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

	FDA Document Number:

Section H Manufacturing / Packaging / Sterilization Sites

v Original o Add o Delete	v Manufacturer o Contract manufacturer	o Contract sterilizer o Repackager / relabeler

Company/institution name: **Polyganics BV**		Establishment registration number: **Not registered**	
Division name (if applicable):		Phone number (include area code): **+31 50 588 6588**	
Street address: **L.J. Zielstraweg 1**		Fax number (include area code): **+31 50 588 6599**	
City: **Groningen**	State/Province: **Groningen**	Country: **The Netherlands**	Zip/Postal Code: **9713-GX**
Contact Name: **(see Section B)**			
Contact Title: **(see Section B)**		Contact e-mail address: **(see Section B)**	

v **Original** o Add o Delete	o Manufacturer o Contract manufacturer	v **Contract sterilizer (EtO)** o Repackager / relabeler

(b) (4)

[redacted]

Company/institution name:		Establishment registration number:	
Division name (if applicable):		Phone number (include area code): ( )	
Street address:		Fax number (include area code): ( )	
City:	State/Province:	Country:	Zip/Postal Code:
Contact Name:			
Contact Title:		Contact e-mail address:	

Indications for Use Form

510(k) Number: _____

Device Name: **Neurolac® Nerve Guide**

Indications for Use:

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

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

(Optional Format 1-2-96)

_____
(Division Sign-Off)

510(k) Number _____

APPLICANT STATEMENTS

Truth and Accuracy Certification

Substantial Equivalence Terminology Statement

PREMARKET NOTIFICATION

Truthful And Accurate Statement

[As Required by 21 CFR 807.87(k)]

I certify that, in my capacity as a Regulatory Affairs representative of Polyganics BV, I believe to the best of my knowledge, that all data and information submitted in the pre-market notification are truthful and accurate and that no material fact has been omitted.

J.B. Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

Date

Premarket Notification [510(k)] Number

Substantial Equivalence Terminology Statement

USE OF THE TERM "SUBSTANTIALLY EQUIVALENT

The use of the term "substantially equivalent" as used herein is intended to be a determination of substantial equivalence under the Federal Food, Drug, and Cosmetic Act, as Amended, and relates to the fact that the product can be marketed without premarket approval or reclassification. Such a determination is not intended to have any bearing whatsoever on the resolution of patent infringement suits or other patent matters.

Section 1: GENERAL INFORMATION

Applicant

Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

FDA Establishment Registration Number: Not Registered yet

Contact Person

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

Tel: +31 50 588 6588
Fax: +31 50 588 6599
E-mail: hak@polyganics.com

Device Name

Trade Name	Common Name	Classification Name
Neurolac Nerve Guide	Nerve Guide	Nerve Cuff 21 CFR 882.5275

Device Classification

Classification Name:
Classification name is "Nerve Cuff" (Ref. Codes of Federal regulations, title 21 – Food and Drugs, Part 882 – Neurological devices, subpart F – Neurological Therapeutic devices, Sec 882.5275)

Class:
Class II

Description: (a) Identification. A nerve cuff is a tubular silicone rubber sheath used to encase a nerve for aid in repairing the nerve (e.g., to prevent ingrowth of scar tissue) and for capping the end of the nerve to prevent the formation of neuroma (tumors).

Manufacturing Facility

Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

FDA Establishment Registration Number: not registered

Sterilization Facility (EtO)

(b) (4) [redacted]

Performance Standards / Special Controls

No performance standards are indicated for this product.

Purpose of Premarket Notification

The reason for this premarket notification is to inform the Food and Drug Administration (FDA) of our intent to market the Polyganics Neurolac Nerve Guide.

Predicate Devices

The following table provides information on the predicate devices.

Trade Name	Manufacturer	510k #	Concurrence Date	Substantial Equivalence
Neurotube™	Neuroregen L.L.C.	K983007 Traditional APPENDIX D	03/22/1999	The tube provides an optimal environment for longitudinal nerve axon growth of the peripheral nerve. For single use only in patients with a peripheral nerve injury where the nerve gap is more than or equal to 8 mm, but less than or equal to 3 cm.
NeuroGen™ Nerve Guide	Integra Life Sciences Corp.	K011168 Traditional APPENDIX E	06/22/2001	NeuroGen™ Nerve guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Software Validation and Certification

This section is not applicable, since the Neurolac Nerve Guide does not utilize software in the performance of its intended use.

Kit Certification

This section is not applicable.

Class III Certification	This section is not applicable. The Neurolac Nerve Guide is a Class II device
510(k) Summary	A summary of safety and effectiveness for the Neurolac Nerve Guide is provided in APPENDIX A.

Section 2: DEVICE DESCRIPTION

Drawings

Please refer to APPENDIX B of this 510(k) premarket notification for an engineering drawing of the subject device.

Intended Use

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.
There are no known contraindications.

For FDA administrative purposes, the intended use of the Polyganics Neurolac Nerve Guide is also documented in a separate form that can be found at the beginning of the 510(k) notification in the section entitled "FDA Administrative Forms"

Device Description

The Neurolac nerve guide is composed of the bioresorbable copolyester poly(DL-lactide-ε-caprolactone). The Neurolac nerve guide provides guidance and protection to regenerating axons.

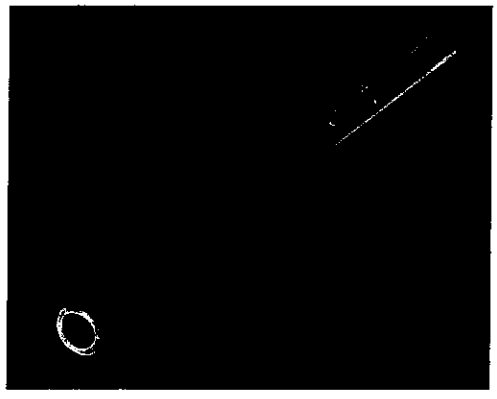


Figure 1. Example of the Neurolac nerve guide

The Neurolac nerve guide elicits a minimal acute inflammatory reaction of the surrounding tissue, which is followed by gradual encapsulation of the tube by fibrous tissue. Degradation of the Neurolac nerve guide occurs through hydrolysis leading to gradual reduction of molecular weight. The Neurolac nerve guide retains its initial mechanical properties up to 8 weeks, whereafter rapid loss of mechanical strength and gradual mass loss occur. The final degradation products, lactic acid and ω-hydroxy hexanoic acid, are resorbed, metabolized and excreted by the body. Animal studies demonstrated that a Neurolac nerve guide is resorbed within 16 months.

The Neurolac nerve guide inner diameter is indicated on the label, and is packed in a tray placed in a Tyvek pouch. The Neurolac nerve guide is indicated for single-use.

The Polyganics Nerve Guide further consists of:

- Packaging
- Labeling
- IFU

Section 3: PROPOSED LABELING

Subject Device Labeling

The following proposed labeling for the subject device Neurolac Nerve Guide is provided in APPENDIX C:

- Outer label (Carton)
- Inner label (Pouch)
- Pre-printed carton text and graphics
- Instructions for Use

Intended Use of the Subject Device

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Promotional Materials

At present, no promotional materials are available for the subject device.

Section 4: COMPARATIVE INFORMATION

Background

The Polyganics Neurolac nerve guide is a biodegradable tube for the repair of transected peripheral nerves.

Intended Use

The Indications for Use for the subject and predicate devices are described in the table below.

Subject Device	Indication for Use
Neurolac	The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Predicate Device	Indication for Use
Neurotube™ APPENDIX D	The Neurotube is intended for single use in patients with an injury to a peripheral nerve, in which the nerve gap is more than or equal to 8 mm but less than or equal to 3 cm. The nerve gap may be created primarily at the time of injury or created secondarily at the time of exploration of failed primary repair
NeuroGen™ APPENDIX E	NeuroGen Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Device Characteristics

The technological characteristics (i.e., design, dimensions material etc.) of the subject Neurolac Nerve Guide and the predicate devices are presented in the table below. The table provides a comparison, demonstrating that the Neurolac is substantially equivalent to the currently marketed predicate device.

Device Characteristics of the Subject and Predicate devices

Characteristics General	Subject Device	Predicate Devices	
	Neurolac®	Neurotube™	NeuroGen ™
510(k) Reference	**This 510(k)**	**K983007**	**K011168**
Sterile	Sterile device	Sterile device	Sterile device
Single Use	Single-use	Single-use	Single-use
Contents packaging	Nerve guide and instructions for use	Nerve guide and instructions for use	Nerve guide and instructions for use
Length	(b)(4) Priduct specs		
Inner Diameter (In.)			
Material			
Biodegradable	Yes	Yes	Yes
Animal derived	No	Yes	No
Indication	Peripheral Nerve discontinuity	Peripheral Nerve discontinuity	Peripheral Nerve discontinuity
Transparent	Yes	No	No

Section 5: PERFORMANCE VERIFICATION

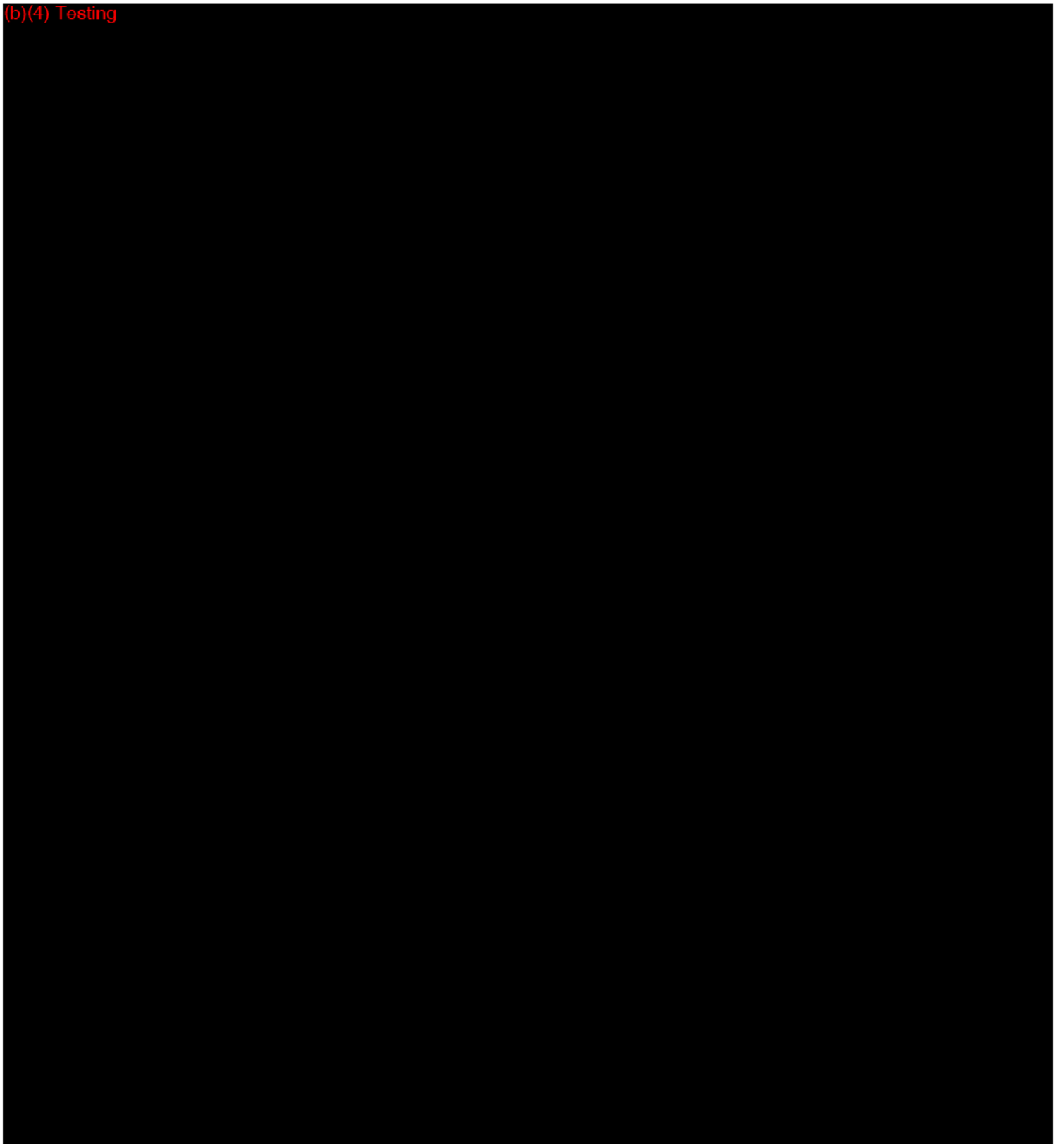
Performance Verification

The performance testing on the Neurolac Nerve Guide was conducted to verify that the meets performance characteristics. The following performance tests were conducted:

	Subject/Test	Report
1	(b) (4)	
2		
3		
4		
5		

Testing was performed on finished sterile products. The test results were all favorable for the Neurolac Nerve guide. The complete performance test reports have been attached as APPENDIX F.

(b)(4) Testing



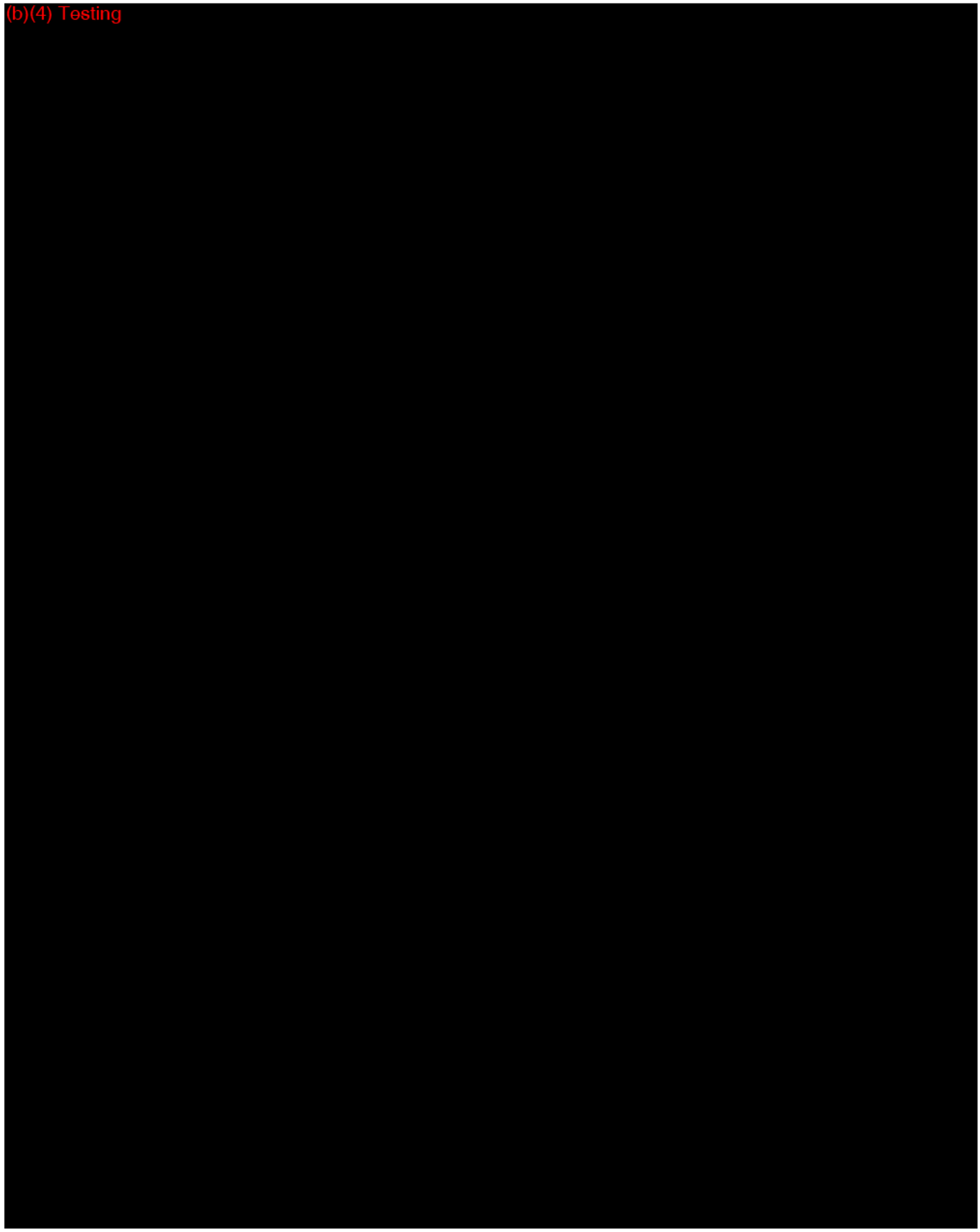
(b)(4) Testing

[redacted]

(b)(4) Testing

[redacted]

(b)(4) Testing



(b)(4) Testing

[redacted]

(b)(4) Testing

[redacted]

(b)(4) Testing

Section 6: BIOCOMPATIBILITY

Background

Testing

(b)(4) Testing

[redacted]

Section 7: STERILIZATION AND PYROGENICITY INFORMATION

Introduction	(b) (4)
Sterilization Method	
Validation Method	
Sterility Assurance Level	
Pyrogen Test Method	

Section 8: PACKAGING AND SHELF-LIFE INFORMATION

Introduction

The Neurolac nerve guides are packaged in a tray (mechanical protection) and subsequently sealed in a Tyvek/PET-PE pouch. The packaging does comply with standards ISO11607.

Packaging Description

The Neurolac nerve guides are packaged in a tray serving as a mechanical protection.

The tray together with a Neurolac nerve guide are packaged in a Tyvek/PET-PE pouch. The pouch carriers a pouch label on the PET-PE layer of the pouch.

The pouch with product in the tray is packaged together with the instructions for use in a carton box. The carton box carries the carton box label.

Product Shelf – Life

The Neurolac nerve guide has a shelf-life (Use By date) of 12 months.

APPENDIX A: 510(K) SUMMARY OF SAFETY AND EFFECTIVINESS

510(k)
Summary of Safety and Effectiveness

Submitter:

Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands
www.polyganics.com

Contact Person:

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Tel : +31 50 588 6588
Fax : +31 50 588 6599
Mobile : +31 653 211 303
E-mail : hak@polyganics.com

Date Prepared:

May 20, 2003

General Provisions:

Trade Name: Neurolac® Nerve guide

Common Name: Nerve guide

Classification Name: Nerve Cuff, 21 CFR 882.5275

Device Classification: Class II

Predicate Devices:

• Neurotube™	Neuroregen L.L.C.	K983007
• NeuroGen™	Integra Life Sciences Corp.	K011168

Performance Standards

For the Nerve Cuff performance, the FDA, under section 514 of the Food, Drug and Cosmetic Act, has not established standards.

Indications for Use

The Neurolac® nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Device Description

Neurolac® is designed to be a flexible and transparent resorbable poly(DL-lactide-co-ε-caprolactone) tube to provide a protective environment for peripheral nerve regeneration after injury and to create a conduit to guide axonal growth across a nerve gap.

Neurolac® nerve guides are provided sterile in Tyvek pouch packages and retainer in a variety of sizes.

Performance Data:

The safety and effectiveness of the Neurolac nerve guides have been demonstrated via data collected from design verification tests and analyses. The design verification testing consisted of the following:

- In vitro suture retention testing
- In vitro degradation testing
- In vivo nerve function recovery

Summary of Substantial Equivalence

The design, fundamental technology and intended use (safety and efficacy) featured with the Neurolac® Nerve Guide are substantially equivalent to those featured with the competitor devices Neurotube™ (ref. 510(k) 983007; Neuroregen L.L.C.) and the NeuroGen™ Nerve Guide (ref. 510(k) 011168; Integra Life Sciences Corporation).

Biocompatibility, mechanical and physical property testing, in vitro degradation testing, and performance testing in an animal model provide reasonable scientific evidence that Neurolac® nerve guide is substantially equivalent to the predicate devices. Evaluation of the Polyganics Neurolac® Nerve guide based on biocompatibility testing, animal tests, results from literature and the comparison of the Neurolac® nerve guide with its predicate devices, shows that the Neurolac® nerve guide is safe for implantation.

APPENDIX B: DEVICE DRAWING

(b) (4)

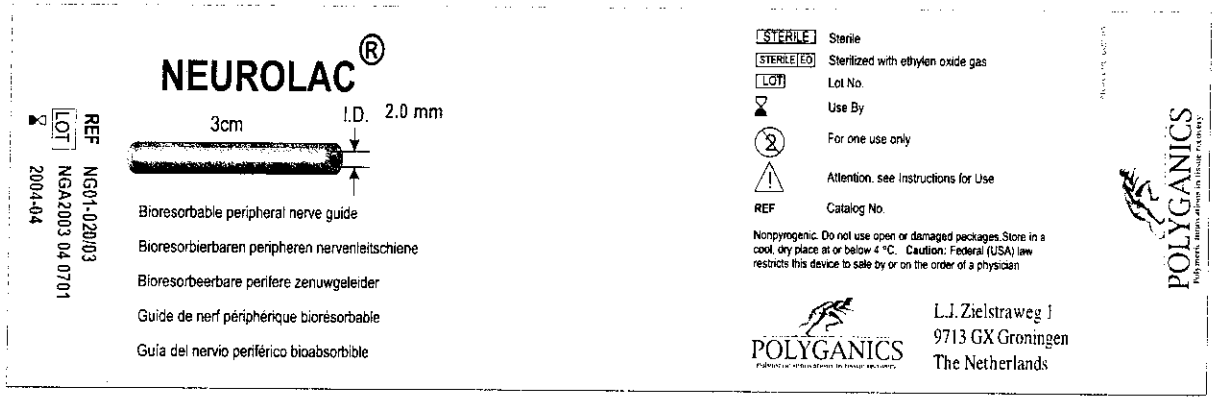
APPENDIX C: DEVICE LABELING

Subject device: Neurolac Nerve Guide

DRAFT

DEVICE LABELING

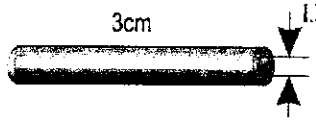
Carton, DRAFT



DEVICE LABELING

Inner label pouch, DRAFT

NEUROLAC®



Bioresorbable peripheral nerve guide

Bioresorbierbaren peripheren nervenleitschiene

Bioresorbeerbare perifere zenuwgeleider

Guide de nerf périphérique biorésorbable

Guía del nervio periférico bioabsorbible

STERILE

STERILE EO

2

REF NG01-020/03

LOT NGA2003 04 2501

2004-04

Nonpyrogenic. Do not use open or damaged packages.Store in a cool, dry place at or below 4 °C. **Caution:** Federal (USA) law restricts this device to sale by or on the order of a physician

POLYGANICS

L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

NGA LBL 001/03

DEVICE LABELING

Instructions for Use, DRAFT

PG002a 2003-01-09 MM024 IFU EN version 19

APPENDIX D: PREDICATE DEVICE NEUROTUBE™

Neuroregen L.L.C.

510(k): K983007

APPENDIX E: PREDICATE DEVICE NEUROGEN™

Integra Life Sciences Corporation

510(k): K011168

APPENDIX F: PERFORMANCE TEST REPORTS

Suture retention testing
In vitro degradation testing
Nerve function recovery: sciatic nerve model
Neurolac nerve guide versus autologous nerve graft
Functional nerve recovery after bridging a 15 mm nerve gap with a Neurolac nerve guide

Suture retention testing

In vitro degradation testing

Nerve function recovery: sciatic nerve model

Neurolac nerve guide versus autologous nerve graft

Functional nerve recovery after bridging a 15 mm nerve gap with a Neurolac nerve guide

APPENDIX G: BIOCOMPATIBILITY DATA

Cytotoxicity
Irritation
Sensitization
Hemocompatibility
Acute systemic toxicity
Pyrogenicity
Mutagenicity /genotoxicity
Sub chronic toxicity
Carcinogenicity
Chronic toxicity
Reproductive toxicity
Implantation

Cytotoxicity

Irritation

Sensitization

Hemocompatibility

Acute systemic toxicity

Pyrogenicity

SS

Mutagenicity /genotoxicity

Sub chronic toxicity

Carcinogenicity

Chronic toxicity

Reproductive toxicity

Implantation

POLYGANICS

Instructions for Use, English

STERILE. Sterilized with ethylene oxide gas. For single use only. Do not autoclave.
CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician.

Neurolac® peripheral nerve guide

Description

The Neurolac nerve guide is composed of the bioresorbable copolyester poly(DL-lactide-ε-caprolactone). The Neurolac nerve guide provides guidance and protection to regenerating axons.
The Neurolac nerve guide elicits a minimal acute inflammatory reaction of the surrounding tissue, which is followed by gradual encapsulation of the tube by fibrous tissue. Degradation of the Neurolac nerve guide occurs through hydrolysis leading to gradual reduction of molecular weight. The Neurolac nerve guide retains its initial mechanical properties up to 8 weeks, whereafter rapid loss of mechanical strength and gradual mass loss occur. The final degradation products, lactic acid and ω-hydroxy hexanoic acid, are resorbed, metabolized and excreted by the body. Animal studies demonstrated that a Neurolac nerve guide is resorbed within 16 months.

The Neurolac nerve guide inner diameter is indicated on the label, and is packed in a tray placed in a Tyvek pouch. The Neurolac nerve guide is indicated for single-use.

Indications

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Contraindications

There are no known contraindications.

Warnings

- The Neurolac nerve guide is for single use only. Do not resterilize or re-use. Structural integrity and/or function may be impaired through cleaning, resterilization, or re-use and may cause adverse patient reactions. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from re-use of (or any part of) the Neurolac nerve guide;
- Sterile unless package has been opened or damaged. Discard open unused nerve guides;
- The Neurolac nerve guide should only be used by physicians who are trained in nerve defect repair techniques. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from use by untrained personnel. The physician should consult recent literature on current medical practice on peripheral nerve repair;
- Nerve regeneration may be suboptimal in elderly, malnourished or debilated patients or in patients suffering from cancer, anaemia, obesity, diabetes, infection or other conditions which may delay wound healing, infected wounds, or moderate tissue inflammatory response characteristic of foreign body response.

Precautions

- Use prior to "Use by date";
- Store in dark, dry place at or below 4°C (39°F);
- Do not expose the nerve guide to organic solvents (e.g. chloroform, acetone);
- Do not use absorbable sutures for fixation of the nerve stumps into the nerve guide;
- Avoid crushing, crimping, kinking or other damage due to application of surgical instruments such as forceps, needle-holders and scissors or during handling of the device;
- Avoid tension on the nerve ends;
- Prevent compression and/or kinking of the Neurolac after the procedure. The use of a protective splint is recommended.

Adverse effects

Adverse events associated with the use of a Neurolac nerve guide may include but are not limited to:

- Failure to provide adequate nerve regeneration at sites where too much tension or compression occurs;
- Failure to provide adequate/complete nerve regeneration;
- Transitory local irritation;
- Infection;
- Allergy;
- Delayed wound healing.

Opening of the package

The pouch is opened in such a way that the tray remains sterile. The tray can be opened by sliding the lid. By clasping the nerve guide at one of its ends between a pair of tweezers, it can be taken from the tray. The lid contains a ruler that may be used as a reference to estimate the gap length or nerve stump diameter.

Surgical Procedure

1. Surgically expose the injured nerve.
2. Resect the injured segment distally and proximally until a nerve stump is identified with no residual intrafascicular scarring.

NOTE: Do not crush the nerve stumps as this can cause extrusion of intra-fascicular components.

3. Measure the length of the defect with all joints in an extended position.
4. If the gap length is between 0 and 20 mm, the injured nerve can be reconstructed with a Neurolac nerve guide.
5. Select the Neurolac nerve guide with the proper internal diameter.

NOTE: It is essential that the internal nerve guide diameter is slightly larger than the diameter of the transected nerve to guarantee optimal nerve regeneration.

6. Cut the selected nerve guide with a pair of scissors or a knife so that the nerve guide is 1 cm longer than the nerve gap.

Under some circumstances immobilization of the nerve ends, as to avoid tension on the nerve ends, may be employed at the discretion of the surgeon. To secure adequate fixation of the nerve ends in the nerve guide, the accepted surgical technique of flat, square ties with additional throws as warranted by surgical circumstance and the experience of the surgeon, is required.

Suturing Technique

1. Place the Neurolac nerve guide in warm saline (37°C) for approximately 1 minute before implantation. This will make the tube more flexible and ease needle passage during suturing.
2. Suture the Neurolac nerve guide by passing the suture (8-0 suture) first through the tube from the outside to the inside and then transversally and superficially through the epineurium and back through the tube from the inside to the outside, after which a tie is made (Fig. 1.1-1.3).
3. When positioning optimization of the nerve ends in the nerve guide is required, it is recommended to place a second suture in the same nerve end (Fig. 1.4).
4. Pull the proximal nerve stump into the nerve guide.

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NOTE: It is recommended that the nerve ends are pulled into the tube for at least 3 mm for optimal nerve regeneration.

5. Fill the tube with heparinized saline, using a solution containing 1000 units of heparin per 100 ml of normal saline (Fig 1.5).
6. Subsequently, use the same procedure, to pull the distal nerve stump into the nerve guide.
7. A minimum space of 5 mm should be left between the nerve ends in the nerve guide.
8. Fill any remaining space with heparinized saline (Fig 1.6) by injecting along the nerve into the lumen of the tube or by penetrating the tube (not the nerve).

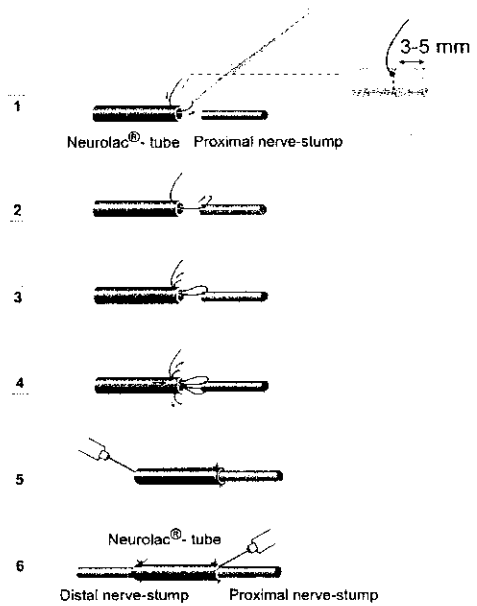


Figure 1. Schematic representation of suture technique for suturing the nerve ends into the nerve guide.

CAUTION: Ensure that no blood enters the nerve guide lumen since this may hinder nerve recovery.
CAUTON: The nerve guide should be implanted and sutured with all joints in an extended position as to assure that no tension occurs on the proximal or distal nerve end when joints are being mobilized.

9. Close the wound and splint to prevent kinking for the first three postoperative weeks. Long-term compression of the nerve guide should be avoided. Patients may be administered oral antibiotics for the first post-operative week.

Dispose contaminated implantation and packaging materials utilizing standard hospital procedures and universal precautions for bio-hazardous waste.

⚠	=	Refer to accompanying instructions for use.
⧗	=	Use by
REF	=	Catalog number
②	=	For single use only
LOT	=	Lot number
STERILE	=	Sterile product
STERILE EO	=	Sterilized by ethylene oxide

Polyganics BV
L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

Telephone +31 50 588 6588
Fax +31 50 588 6599

DISCLAIMER OF WARRANTY AND LIMITATION OF REMEDY
There is no express or implied warranty, including without limitation any implied warranty of merchantability or fitness for a particular purpose, on the Polyganics product(s) described in this publication. Under no circumstances shall Polyganics BV be liable for any direct, incidental, or consequential damages other than as expressly provided by specific law. No person has the authority to bind Polyganics to any representation or warranty except as specifically set forth herein.

Descriptions or specifications in Polyganics BV printed matter, including this publication, are meant solely to generally describe the product at the time of manufacture and do not constitute any express warranties.

Polyganics BV will not be responsible for any direct, incidental, or consequential damages resulting from reuse of the product.

8

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

OCT 1 0 2003

Jan Bart Hak, Ph.D.
Manager, Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands

Re: K032115
Trade/Device Name: Neurolac® Nerve Guide
Regulation Number: 21 CFR 882.5275
Regulation Name: Nerve cuff
Regulatory Class: II
Product Code: JXI
Dated: July 3, 2003
Received: July 17, 2003

Dear Dr. Hak:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

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

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Office of Compliance at (301) 594-4659. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/dsma/dsmamain.html

Sincerely yours.

Miriam C. Provost

for Celia M. Witten, Ph.D., M.D.
Director
Division of General, Restorative
and Neurological Devices
Office of Device Evaluation
Center for Devices and Radiological Health

Enclosure

Indications for Use Form

510(k) Number: K032115

Device Name: **Neurolac® Nerve Guide**

Indications for Use:

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

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

(Optional Format 1-2-96)

(Division Sign-Off)

510(k) Number _____

Miriam C. Provost
(Division Sign-Off)
Division of General, Restorative
and Neurological Devices

510(k) Number K032115

DEPARTMENT OF HEALTH AND HUMAN SERVICES Public Health Service

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

July 21, 2003

POLYGANICS BV
C/O VIKTOR J. NICKOLSON
33 RIVER ST. UNIT 813
HOBOKEN, NJ 07030
ATTN: VIKTOR J. NICKOLSON

510(k) Number: K032115
Received: 17-JUL-2003
Product: NEUROLAC NERVE GUIDE MODELS NG01-15/03, NG01-020/03, NG01 025/03, NG01-030/03

The Food and Drug Administration (FDA), Center for Devices and Radiological Health (CDRH), has received the Premarket Notification you submitted in accordance with Section 510(k) of the Federal Food, Drug, and Cosmetic Act (Act) for the above referenced product. We have assigned your submission a unique 510(k) number that is cited above. Please refer prominently to this 510(k) number in any future correspondence that relates to this submission. We will notify you when the processing of your premarket notification 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.

The Act, as amended by the Medical Device User Fee and Modernization Act of 2002 (MDUFMA)(Public Law 107-250), authorizes FDA to collect user fees for premarket notification submissions. (For more information on MDUFMA, you may refer to our website at http://www.fda.gov/oc/mdufma).

Please remember that all correspondence concerning your submission MUST be sent to the Document Mail Center (DMC)(HFZ-401) 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 www.fda.gov/cdrh/ode/a02-01.html.

You should be familiar with the manual entitled, "Premarket Notification 510(k) Regulatory Requirements for Medical Devices" available from DSMICA. If you have other procedural or policy questions, or want information on how to check on the status of your submission, please contact DSMICA at (301) 443-6597 or its toll-free number (800) 638-2041, or at their Internet address http://www.fda.gov/cdrh/dsmamain.html or me at (301)594-1190.

Sincerely yours,

Marjorie Shulman
Supervisory Consumer Safety Officer
Office of Device Evaluation
Center for Devices and Radiological Health

DEPARTMENT OF HEALTH AND HUMAN SERVICES Public Health Service

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

July 09, 2003

POLYGANICS BV
C/O VIKTOR J. NICKOLSON
33 RIVER ST. UNIT 813
HOBOKEN, NJ 07030
ATTN: VIKTOR J. NICKOLSON

510(k) Number: K032115
Received: 09-JUL-2003
Product: NEUROLAC NERVE GUIDE
User Fee ID Number: 83121-15/03,
NG01-020/03,
NG01-025/03,

The Food and Drug Administration (FDA) Center for Devices and Radiological Heath (CDRH), has received the Premarket Notification you submitted in accordance with Section 510(k) of the Federal Food, Drug, and Cosmetic Act (Act) for the above referenced product. We have assigned your submission a unique 510(k) number that is cited above. Please refer prominently to this 510(k) number in any future correspondence that relates to this submission. YOU MAY NOT PLACE THIS DEVICE INTO COMMERCIAL DISTRIBUTION UNTIL YOU RECEIVE A LETTER FROM FDA ALLOWING YOU TO DO SO.

The Act, as amended by the Medical Device User Fee and Modernization Act of 2002 (MDUFMA) (Public Law 107-250), specifies that a submission shall be considered incomplete and shall not be accepted for filing until fees have been paid (Section 738(f)). Our records indicate that you have not submitted the user fee payment information and therefore your 510(k) cannot be filed and has been placed on hold. The payment information we need in order to begin the review of your 510(k) includes, the user fees cover sheet with the payment ID faxed to the Office of Financial Management at (301) 827-9213 and a check mailed to:

By Regular Mail	By Private Courier (e.g., Fed Ex, UPS, etc.)
Food and Drug Administration	U.S. Bank
P.O. Box 956733	956733
St. Louis, MO 63195-6733.	1005 Convention Plaza
	St. Louis, MO 63101
	(314) 418-4983

The check should be made out to the Food and Drug Administration referencing the payment identification number, and a copy of the User Fee Cover sheet should be included with the check. A copy of the Medical Device User Fee Cover Sheet should also be faxed to CDRH at (301) 594-2977 referencing the 510(k) number if you have not already sent it in with your 510(k) submission. After the FDA has been notified of the receipt of your user fee payment, your 510(k) will be filed and the review will begin. If payment has not been received within 30 days, your 510(k) will be deleted from the system. Additional information on user fees and how to submit your user fee payment may be found at http://www.fda.gov/oc/mdufma.

Please note that since your 510(k) has not been reviewed, additional information may be required during the review process and the file may be placed on hold once again. If you are unsure as to whether or not you need to file an application with FDA or what type of application to file, you should first telephone the Division of Small Manufacturers, International and Consumer Assistance (DSMICA), for guidance at (301)443-6597 or its toll-fee number (800)638-2041, or contact them at their Internet address http://www.fda.gov/cdrh/dsmamain.html, or you may submit a 513(g) request to the Document Mail Center at the address above. If you have any questions concerning the contents of this letter, you may contact me at (301) 594-1190.

Sincerely yours,

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

POLYGANICS
Polymeric innovations in tissue recovery

Polyganics BV
L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

Telephone (31) 50 588 65 88
Telefax (+31) 50 588 65 99
E-mail mail@polyganics.com
Internet www.polyganics.com

United States Agent Notification
Information processing and Office Automation Branch
Office of Compliance
Center for Devices and Radiological Health
9200 Corporate Blvd, HFZ-308
Rockville, MD 20850-4015
USA

Our ref. : 03-029/PG002a Neurolac
Subject : U.S. Agent Notification

Groningen, July 3, 2003

Dear Sir, Madam,

I am providing the following information to comply with the U.S. agent requirement for foreign establishments.

Establishment information

Name:	Polyganics BV.
Registration #:	Not yet registered, 510k process ongoing.
Street address:	L.J. Zielstraweg 1
City:	Groningen
Zip code:	9713 GX
Country:	The Netherlands
Official Correspondent:	Jan Bart Hak, Ph.D.
Phone	+31 50 588 6588
Fax	+31 50 588 6599
E-mail	hak@polyganics.com
Web:	www.polyganics.com

39

Bank account ABN AMRO Groningen 51.35.29.195
Commercial Reg. No. 02067151
VAT No. NL.80.85.30.525.B01

United States Agent Information

Name:	Viktor J. Nickolson
Street address:	33 River St. Unit 813
City:	Hoboken
State:	NJ
Zip code:	07030
Country:	United States of America
Phone	+1 201 656 4123
E-mail	victorj.nickolson@mac.com

Yours sincerely,

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory affairs

510(k)
PREMARKET NOTIFICATION
TABLE OF CONTENTS

DEPARTMENT OF HEALTH AND HUMAN SERVICES
FOOD AND DRUG ADMINISTRATION

MEDICAL DEVICE USER FEE COVER SHEET

PAYMENT IDENTIFICATION NUMBER: (b)(4) [redacted]

Write the Payment Identification Number on your check.

See Instructions Before Completing This Cover Sheet

A completed cover sheet must accompany each original premarket application or supplement listed in Box 3 of this cover sheet. Other premarket application types do not require the use of this cover sheet; see list in the instructions. Payment instructions and fee rates can be found at the following website: http://www.fda.gov/oc/mdufma. The following three actions must be taken to properly submit your premarket application and fee payment:

1. FAX a copy of this completed cover sheet to the Food and Drug Administration at (301) 827-9213 before payment is sent.
2. Include a copy of this completed cover sheet with the check made payable to the Food and Drug Administration and mail them to the Food and Drug Administration, P.O. Box 956733, St. Louis, MO 63195-6733. *(Note: In no case should payment be submitted with the premarket application.)* Also remember that the Payment Identification Number must be written on the check.
   If you prefer to send a check by a courier, the courier may deliver the check and cover sheet to: US Bank, 956733, 1005 Convention Plaza, St. Louis, MO 63101. (Note: This address is for courier delivery only. Contact the US Bank at 314-418-4821 if you have any questions concerning courier delivery.)
3. Include a copy of this completed cover sheet in volume one of the premarket application when submitting to the Food and Drug Administration at either the CBER or CDRH Document Mail Center.

1. COMPANY NAME AND ADDRESS (Include name, street address, city, state, country, and post office code)

POLYGANICS BV
L.J. ZIELSTRAWEG 1
GRONINGEN, 9713 GX
NL

1.1 EMPLOYER IDENTIFICATION NUMBER (EIN)

2. CONTACT NAME
JAN-BART HAK

2.1 E-MAIL ADDRESS
hak@polyganics.com

2.2 TELEPHONE NUMBER (Include area code)
+31 50 588 6588

2.3 FACSIMILE (FAX) NUMBER (Include area code)
+31 50 588 6599

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: http://www.fda.gov/oc/mdufma)

Select an application type:

- ☑ Premarket notification (510(k)); except for third party reviews
- ☐ Biologic License Application (BLA)
- ☐ Premarket Approval Application (PMA)
- ☐ Modular PMA
- ☐ Product Development Protocol (PDP)
- ☐ Premarket Report (PMR)

3.1 Select one of the types below:

- ☑ Original Application

Supplement Types:

- ☐ Efficacy (BLA)
- ☐ Panel Track (PMA, PMR, PDP)
- ☐ Real-Time (PMA, PMR, PDP)
- ☐ 180-day (PMA, PMR, PDP)

4. ARE YOU A SMALL BUSINESS? (See the instructions for more information on determining this status.)

☐ YES, I meet the small business criteria and have submitted the required qualifying documents to FDA ☑ NO, I am not a small business

4.1 If Yes, please enter your Small Business Decision Number:

5. IS THIS PREMARKET APPLICATION COVERED BY ANY OF THE FOLLOWING USER FEE **EXCEPTIONS**? IF SO, CHECK THE APPLICABLE EXCEPTION.

- ☐ This application is the first PMA submitted by a qualified small business, including any affiliates, parents, and partner firms
- ☐ This biologic application is submitted under section 351 of the Public Health Service Act for a product licensed for further manufacturing use only
- ☐ The sole purpose of the application is to support conditions of use for a pediatric population
- ☐ The application is submitted by a state or federal government entity for a device that is not to be distributed commercially

6. 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).)

☐ YES ☑ NO

7. USER FEE PAYMENT AMOUNT SUBMITTED FOR THIS PREMARKET APPLICATION

(b)(4) [redacted]

Submission Cover Sheet				
Date of Submission: **July 3, 2003**		FDA Document Number:		
Section A	**Type of Submission**			
PMA o Original Submission o Modules Submission o Amendment o Report o Report Amendment	**PMA Supplement** o Regular o Special o Panel Track o 30-day Supplement o 30-day Notice o 135-day Supplement o Real-time Review o Amendment to PMA Supplement	**PDP** o Presubmission summary o Original PDP o Notice of intent to start clinical trials o Intention to submit Notice of Completion o Notice of Completion o Amendment to PDP o Report	**510(k)** v Original Submission v Traditional o Special o Abbreviated o Additional Information o Traditional o Special o Abbreviated	**Meeting** o Pre-IDE meeting o Pre-PMA meeting o Pre-PDP meeting o 180-day meeting o Other (specify):
IDE o Original Submission o Amendment o Supplement	**Humanitarian Device Exemption** o Original submission o Amendment o Supplement o Report	**Class II Exemption** o Original submission o Additional information	**Evaluation of Automatic Class III Designation** o Original submission o Additional information	**Other Submission** Describe submission:

Section B	**Applicant or Sponsor**		
Company / Institution name: **Polyganics BV**		Establishment registration number: **Not registered.**	
Division name (if applicable): **Not Applicable**		Phone number (include area code): **+31 50 588 6588**	
Street address: **L.J. Zielstraweg 1**		FAX number (include area code): **+31 50 588 6599**	
City: **Groningen**	State/Province: **Groningen**	Country: **The Netherlands**	Zip/Postal Code: **9713-GX**
Contact name: **Jan-Bart Hak**			
Contact title: **Manager Clinical and Regulatory Affairs**		Contact e-mail address: **hak@polyganics.com**	

Section C	**Submission Correspondent (if different from above)**		
Company / Institution name: not applicable		Establishment registration number: not applicable	
Division name (if applicable): not applicable		Phone number (include area code): not applicable	
Street address: not applicable		FAX number (include area code): not applicable	
City: not applicable	State/Province: not applicable	Country: not applicable	Zip/Postal Code: not applicable
Contact name: not applicable			
Contact title: not applicable		Contact e-mail address: not applicable	

Section D1 Reason for Submission – PMA, PDP, or HDE

- o New device
- o Withdrawal
- o Additional or expanded indications
- o Licensing agreement

- o Change in design, component, or specifications:
  - o Software
  - o Color Additive
  - o Material
  - o Specifications
  - o Other (specify below):

- o Location Change:
  - o Manufacturer
  - o Sterilizer
  - o Packager
  - o Distributor

- o Process Change:
  - o Manufacturing
  - o Sterilization
  - o Packaging
- o Other (specify below):

- o Labeling Change:
  - o Indications
  - o Instructions
  - o Performance characteristics
  - o Shelf Life
  - o Trade Name
- o Other (specify below):

- o Report submissions:
  - o Annual or periodic
  - o Post-approval study
  - o Adverse reaction
  - o Device defect
  - o Amendment

- o Response to FDA correspondence:
  - o Request for applicant hold
  - o Request for removal of applicant hold
  - o Request for extension
  - o Request to remove or add manufacturing site
- o Other reason (specify):

- o Change in ownership
- o Change in correspondent

Section D2 Reason for Submission – IDE

- o New device
- o Addition of institution
- o Expansion/extension of study
- o IRB certification
- o Request hearing
- o Request waiver
- o Termination of Study
- o Withdrawal of application
- o Unanticipated adverse effect
- o Notification of emergency use
- o Compassionate use request
- o Treatment IDE
- o Continuing availability request

- o Other reason (specify):

- o Change in:
  - o Correspondent
  - o Design
  - o Informed Consent
  - o Manufacturer
  - o Manufacturing process
  - o Protocol – feasibility
  - o Protocol – other
  - o Sponsor

- o Report Submission:
  - o Current investigator
  - o Annual progress
  - o Site waiver limit reached
  - o Final

- o Response to FDA letter concerning:
  - o Conditional approval
  - o Deemed approved
  - o Deficient final report
  - o Deficient progress report
  - o Deficient investigator report
  - o Disapproval
  - o Request extension of time to respond to FDA
  - o Request meeting

Section D3 Reason for Submission – 510(k)

- v New device
- o Additional or expanded indications
- oother reason (specify)

- o Change in technology
- o Change in design

- o Change in materials
- o Change in manufacturing process

Section E	**Additional Information on 510(k) Submissions**			
Product codes of devices to which substantial equivalence is claimed:				Summary of, or statement concerning, safety and effectiveness data:
1 **JXI**	2	3	4	v 510(k) summary attached o 510(k) statement

Information on devices to which substantial equivalence is claimed:		
510(k) Number	Trade or proprietary or model name	Manufacturer
1. #K983007	**Neurotube™**	**Neuroregen L.L.C.**
2. #K011168	**NeuroGen™ Nerve Guide**	**Integra Life Sciences Corp.**

Section F	**Product Information – Applicable to All Applications**
Common or usual or classification name: Nerve Cuff	
Trade or proprietary or model name	Model number
Neurolac® Nerve Guide	**NG01-015/03**
Neurolac® Nerve Guide	**NG01-020/03**
Neurolac® Nerve Guide	**NG01-025/03**
Neurolac® Nerve Guide	**NG01-030/03**

FDA document numbers of all prior related submissions (regardless of outcome):					
1 N.A.	**2**	**3**	**4**	**5**	**6**

Data included in submission: v Laboratory testing v Animal trials o Human trials

Section G	**Product Classification – Applicable to All Applications**	
Product code: **JXI**	C.F.R. section: **21 CFR 882.5275**	Device class: o Class I v **Class II** o Class III o Unclassified
		Device class: o Class I o Class II o Class III o Unclassified
		Device class: o Class I o Class II o Class III o Unclassified

Classification panel: **Neurology (Neurological Therapeutic Devices)**

Indications (from labeling): The Neurolac nerve guide is indicated for the reconstruction of peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.
The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

FDA ADMINISTRATIVE FORMS

Premarket Submission Cover Sheet

Indications for Use Form

	FDA Document Number:

Section H Manufacturing / Packaging / Sterilization Sites

v Original o Add o Delete	v Manufacturer o Contract manufacturer	o Contract sterilizer o Repackager / relabeler

Company/institution name: **Polyganics BV**	Establishment registration number: **Not registered**
Division name (if applicable):	Phone number (include area code): **+31 50 588 6588**
Street address: **L.J. Zielstraweg 1**	Fax number (include area code): **+31 50 588 6599**

City: **Groningen**	State/Province: **Groningen**	Country: **The Netherlands**	Zip/Postal Code: **9713-GX**

Contact Name: **(see Section B)**	
Contact Title: **(see Section B)**	Contact e-mail address: **(see Section B)**

v **Original** o Add o Delete	o Manufacturer o Contract manufacturer	v **Contract sterilizer (EtO)** o Repackager / relabeler

(b)(4)

[redacted]

o Original o Add o Delete	o Manufacturer o Contract manufacturer	o Contract sterilizer o Repackager / relabeler

Company/institution name:	Establishment registration number:
Division name (if applicable):	Phone number (include area code): ( )
Street address:	Fax number (include area code): ( )

City:	State/Province:	Country:	Zip/Postal Code:

Contact Name:	
Contact Title:	Contact e-mail address:

Indications for Use Form

510(k) Number: _____

Device Name: **Neurolac® Nerve Guide**

Indications for Use:

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.
The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

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

(Optional Format 1-2-96)

_____
(Division Sign-Off)

510(k) Number _____

APPLICANT STATEMENTS

Truth and Accuracy Certification

Substantial Equivalence Terminology Statement

PREMARKET NOTIFICATION

Truthful And Accurate Statement

[As Required by 21 CFR 807.87(k)]

I certify that, in my capacity as a Regulatory Affairs representative of Polyganics BV, I believe to the best of my knowledge, that all data and information submitted in the pre-market notification are truthful and accurate and that no material fact has been omitted.

July/03/2003
Date

J.B. Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

Premarket Notification [510(k)] Number

Substantial Equivalence Terminology Statement

USE OF THE TERM "SUBSTANTIALLY EQUIVALENT

The use of the term "substantially equivalent" as used herein is intended to be a determination of substantial equivalence under the Federal Food, Drug, and Cosmetic Act, as Amended, and relates to the fact that the product can be marketed without premarket approval or reclassification. Such a determination is not intended to have any bearing whatsoever on the resolution of patent infringement suits or other patent matters.

Section 1: GENERAL INFORMATION

Applicant

Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

FDA Establishment Registration Number: Not Registered yet

Contact Person

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

Tel: +31 50 588 6588
Fax: +31 50 588 6599
E-mail: hak@polyganics.com

Device Name

Trade Name	Common Name	Classification Name
Neurolac Nerve Guide	Nerve Guide	Nerve Cuff 21 CFR 882.5275

Device Classification

Classification Name:
Classification name is "Nerve Cuff" (Ref. Codes of Federal regulations, title 21 – Food and Drugs, Part 882 – Neurological devices, subpart F – Neurological Therapeutic devices, Sec 882.5275)

Class:
Class II

Description: (a) Identification. A nerve cuff is a tubular silicone rubber sheath used to encase a nerve for aid in repairing the nerve (e.g., to prevent ingrowth of scar tissue) and for capping the end of the nerve to prevent the formation of neuroma (tumors).

Manufacturing Facility

Polyganics BV
L.J. Zielstraweg 1
9713-GX Groningen
The Netherlands

FDA Establishment Registration Number: not registered

Sterilization Facility (EtO)

(b)(4) [redacted]

Performance Standards / Special Controls

No performance standards are indicated for this product.

Purpose of Premarket Notification

The reason for this premarket notification is to inform the Food and Drug Administration (FDA) of our intent to market the Polyganics Neurolac Nerve Guide.

Predicate Devices

The following table provides information on the predicate devices.

Trade Name	Manufacturer	510k #	Concurrence Date	Substantial Equivalence
Neurotube™	Neuroregen L.L.C.	K983007 Traditional APPENDIX D	03/22/1999	The tube provides an optimal environment for longitudinal nerve axon growth of the peripheral nerve. For single use only in patients with a peripheral nerve injury where the nerve gap is more than or equal to 8 mm, but less than or equal to 3 cm.
NeuroGen™ Nerve Guide	Integra Life Sciences Corp.	K011168 Traditional APPENDIX E	06/22/2001	NeuroGen™ Nerve guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Software Validation and Certification

This section is not applicable, since the Neurolac Nerve Guide does not utilize software in the performance of its intended use.

Kit Certification

This section is not applicable.

Class III Certification	This section is not applicable. The Neurolac Nerve Guide is a Class II device
510(k) Summary	A summary of safety and effectiveness for the Neurolac Nerve Guide is provided in APPENDIX A.

Section 2: DEVICE DESCRIPTION

Drawings

Please refer to APPENDIX B of this 510(k) premarket notification for an engineering drawing of the subject device.

Intended Use

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.
The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

For FDA administrative purposes, the intended use of the Polyganics Neurolac Nerve Guide is also documented in a separate form that can be found at the beginning of the 510(k) notification in the section entitled "FDA Administrative Forms"

Device Description

The Neurolac nerve guide is composed of the bioresorbable copolyester poly(DL-lactide-ε-caprolactone). The Neurolac nerve guide provides guidance and protection to regenerating axons, and prevent ingrowth of fibrous tissue into the nerve gap during nerve regeneration from the proximal to the distal nerve stump of the transected nerve.

Figure 1. Example of the Neurolac nerve guide

The Neurolac nerve guide elicits a minimal acute inflammatory reaction of the surrounding tissue, which is followed by gradual encapsulation of the tube by fibrous tissue. Degradation of the Neurolac nerve guide occurs through hydrolysis leading to gradual reduction of molecular weight. The Neurolac nerve guide retains its initial mechanical properties up to 8 weeks, whereafter rapid loss of mechanical strength and gradual mass loss occur. The final degradation products, lactic acid and ω-hydroxy hexanoic acid, are resorbed, metabolized and excreted by the body. Animal studies demonstrated that a Neurolac nerve guide is resorbed within 16 months.

The Neurolac nerve guide inner diameter is indicated on the label, and is packed in a tray placed in a Tyvek pouch. The Neurolac nerve guide is indi-

cated for single-use.

The Polyganics Nerve Guide further consists of:

- Packaging
- Labeling
- IFU

Section 3: PROPOSED LABELING

Subject Device Labeling

The following proposed labeling for the subject device Neurolac Nerve Guide is provided in APPENDIX C:

- Outer label (Carton)
- Inner label (Pouch)
- Pre-printed carton text and graphics
- Instructions for Use

Intended Use of the Subject Device

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.
The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

Promotional Materials

At present, no promotional materials are available for the subject device.

Section 4: COMPARATIVE INFORMATION

Background

The Polyganics Neurolac nerve guide is a biodegradable tube for the repair of transected peripheral nerves.

Intended Use

The Indications for Use for the subject and predicate devices are described in the table below.

Subject Device	Indication for Use
Neurolac	The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve. The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

Predicate Device	Indication for Use
Neurotube™ APPENDIX D	The Neurotube is intended for single use in patients with an injury to a peripheral nerve, in which the nerve gap is more than or equal to 8 mm but less than or equal to 3 cm. The nerve gap may be created primarily at the time of injury or created secondarily at the time of exploration of failed primary repair
NeuroGen™ APPENDIX E	NeuroGen Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Device Characteristics

The technological characteristics (i.e., design, dimensions material etc.) of the subject Neurolac Nerve Guide and the predicate devices are presented in the table below. The table provides a comparison, demonstrating that the Neurolac is substantially equivalent to the currently marketed predicate device.

Device Characteristics of the Subject and Predicate devices

Characteristics General	Subject Device	Predicate Devices	
	Neurolac®	Neurotube™	NeuroGen ™
510(k) Reference	**This 510(k)**	**K983007**	**K011168**
Sterile	Sterile device	Sterile device	Sterile device
Single Use	Single-use	Single-use	Single-use
Contents packaging	Nerve guide and instructions for use	Nerve guide and instructions for use	Nerve guide and instructions for use
Length	(b)(4)		
Inner Diameter (In.)			
Material			
Biodegradable	Yes	Yes	Yes
Animal derived	No	Yes	No
Indication	Peripheral Nerve discontinuity	Peripheral Nerve discontinuity	Peripheral Nerve discontinuity
Transparent	Yes	No	No

Section 5: PERFORMANCE VERIFICATION

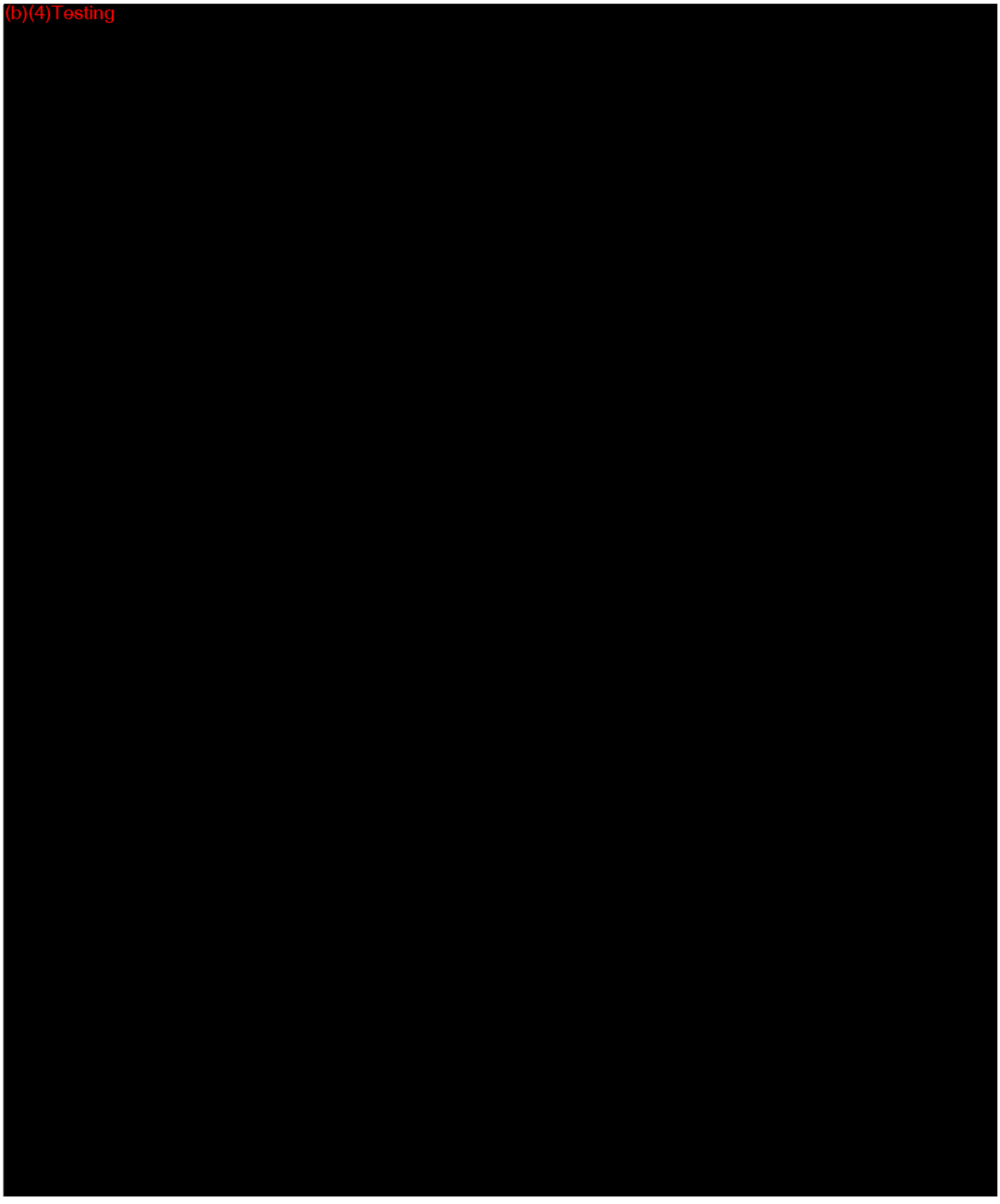
Performance Verification

The performance testing on the Neurolac Nerve Guide was conducted to verify that the meets performance characteristics. The following performance tests were conducted:

	Subject/Test	Report
1	(b)(4)	
2		
3		
4		
5		

Testing was performed on finished sterile products. The test results were all favorable for the Neurolac Nerve guide. The complete performance test reports have been attached as APPENDIX F.

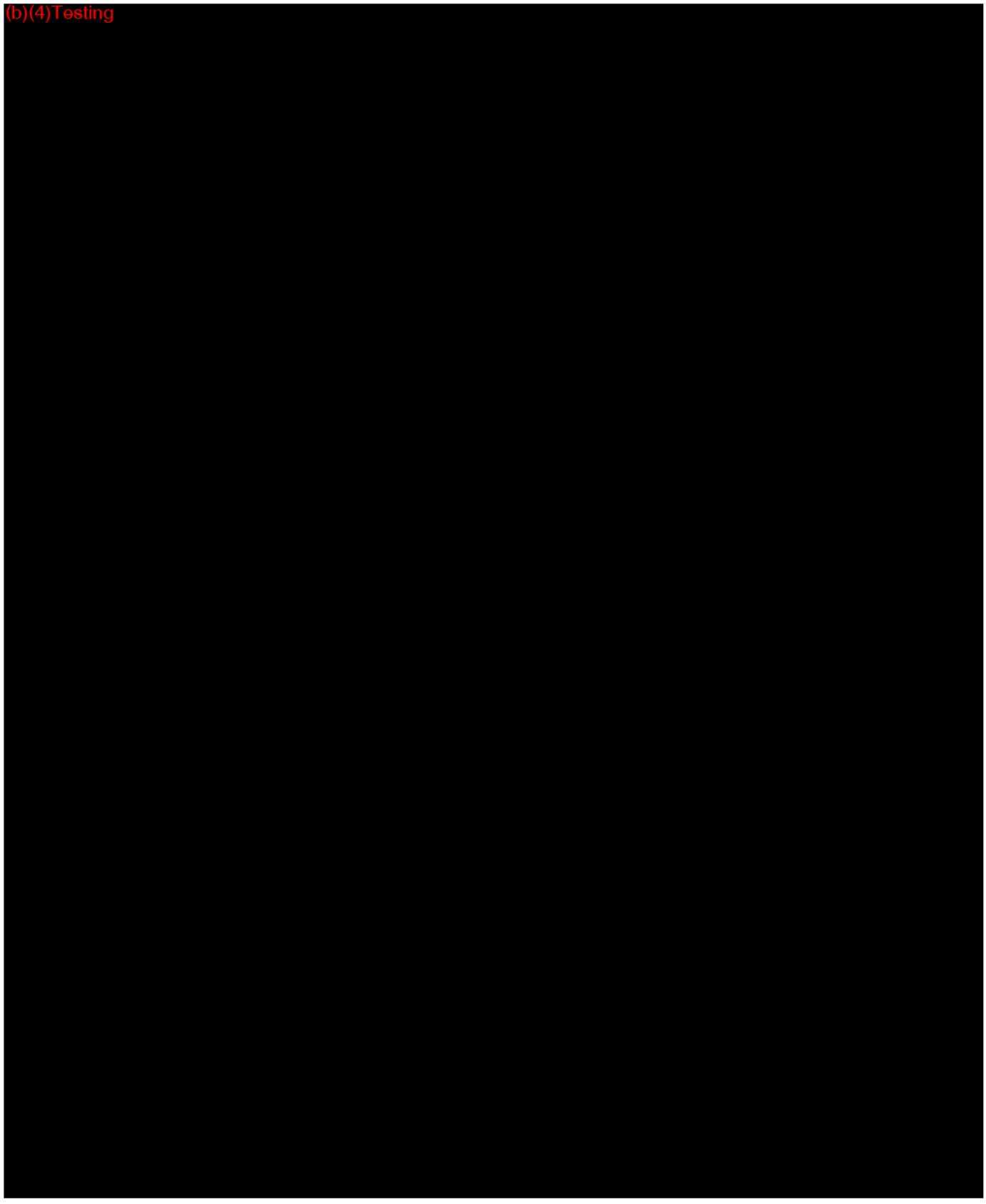
(b)(4)Testing



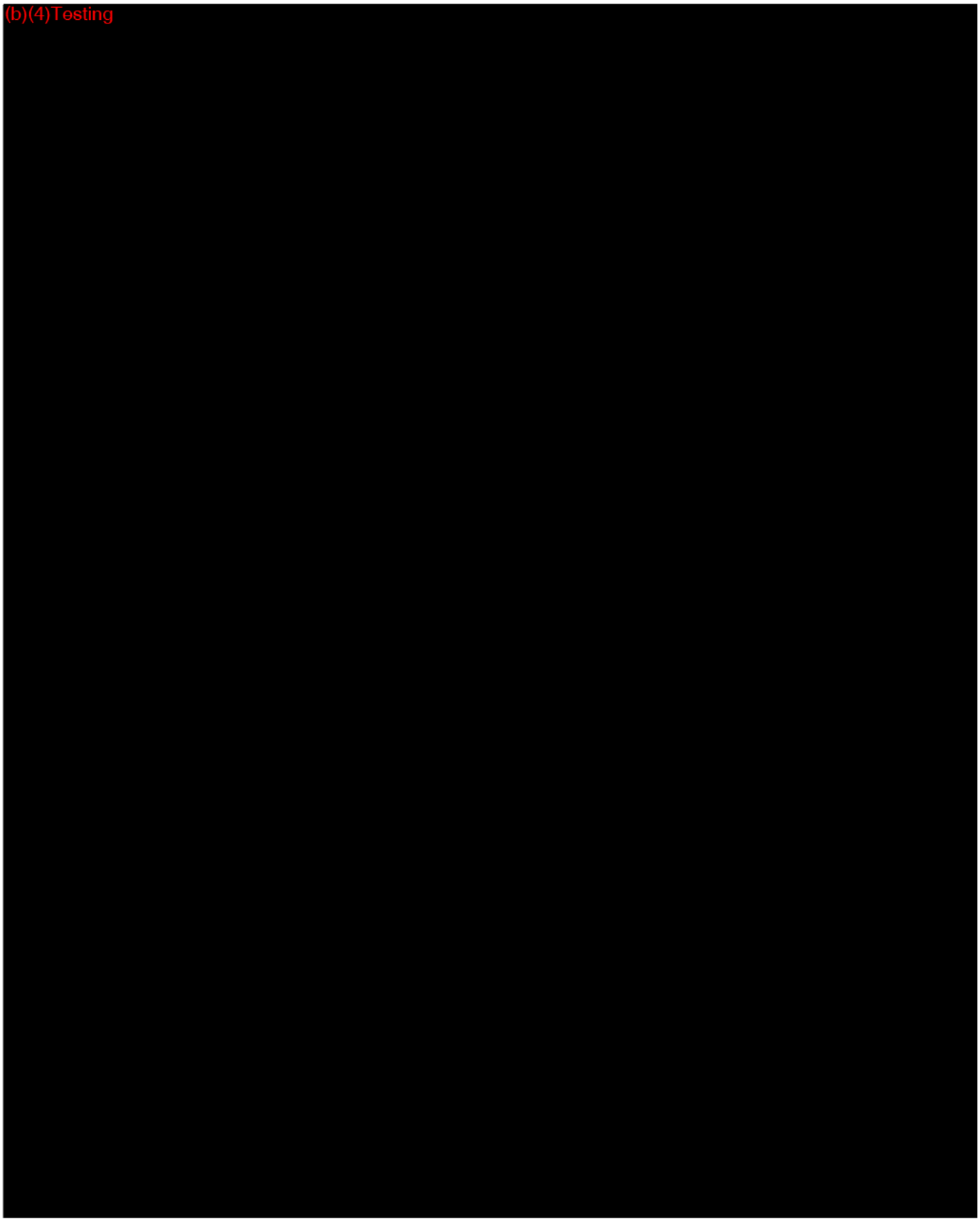
(b)(4)Testing

[redacted]

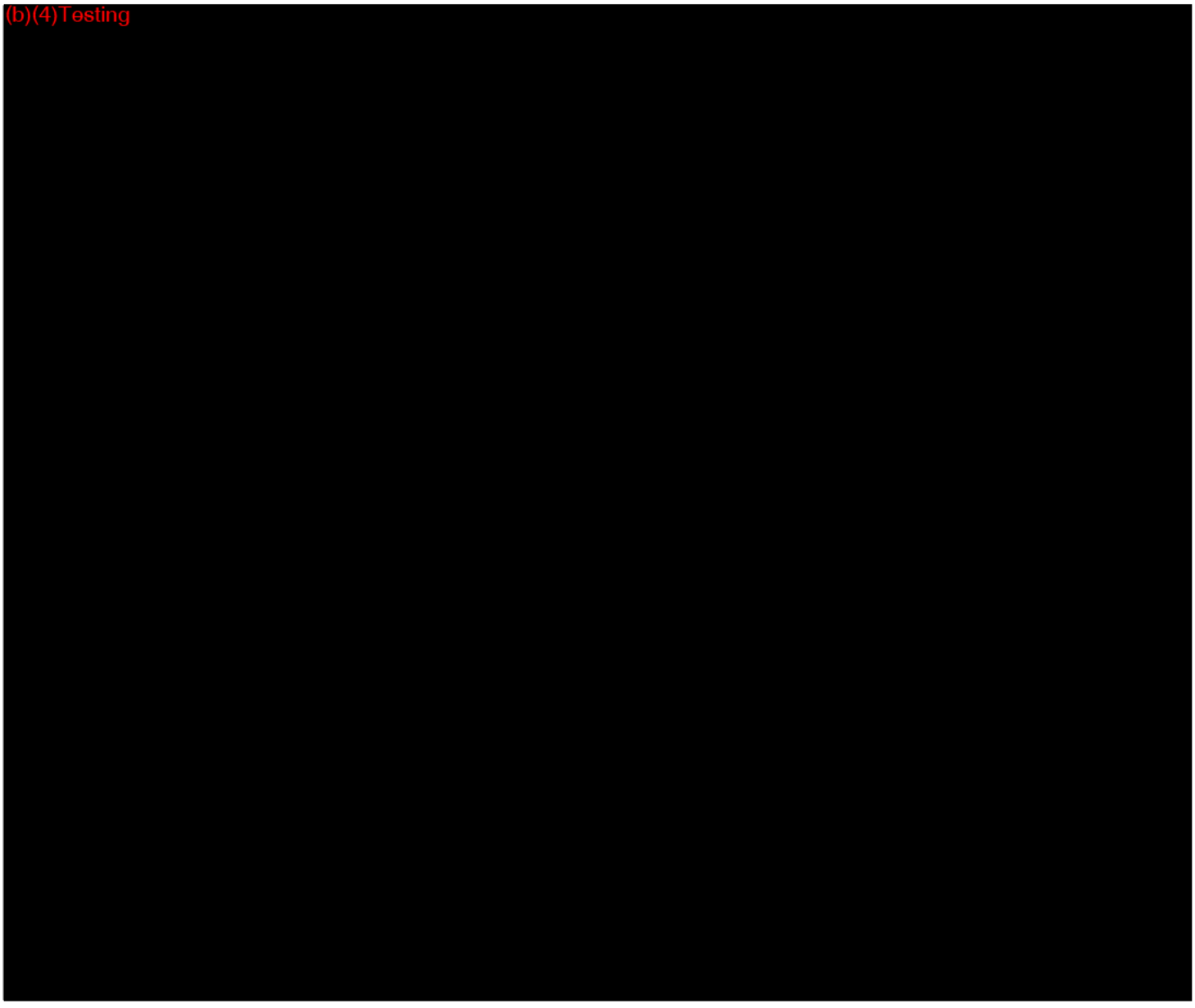
(b)(4)Testing



(b)(4)Testing



(b)(4)Testing



(b)(4)Testing

[redacted]

[1] SFI = 0: normal; SFI = -100: total impairment.

(b)(4)Testing

Section 6: BIOCOMPATIBILITY

Background

(b) (4)

Testing

Section 7: STERILIZATION AND PYROGENICITY INFORMATION

Introduction	(b) (4)
Sterilization Method	
Validation Method	
Sterility Assurance Level	
Pyrogen Test Method	

Section 8: PACKAGING AND SHELF-LIFE INFORMATION

Introduction

The Neurolac nerve guides are packaged in a tray (mechanical protection) and subsequently sealed in a Tyvek/PET-PE pouch. The packaging does comply with standards ISO11607.

Packaging Description

The Neurolac nerve guides are packaged in a tray serving as a mechanical protection.

The tray together with a Neurolac nerve guide are packaged in a Tyvek/PET-PE pouch. The pouch carriers a pouch label on the PET-PE layer of the pouch.

The pouch with product in the tray is packaged together with the instructions for use in a carton box. The carton box carries the carton box label.

Product Shelf – Life

The Neurolac nerve guide has a shelf-life (Use By date) of 12 months.

APPENDIX A: 510(K) SUMMARY OF SAFETY AND EFFECTIVINESS

510(k)
Summary of Safety and Effectiveness

Submitter:	Polyganics BV L.J. Zielstraweg 1 9713 GX, Groningen The Netherlands www.polyganics.com
Contact Person:	Jan Bart Hak, Ph.D. Manager Clinical and Regulatory Affairs Tel : +31 50 588 6588 Fax : +31 50 588 6599 Mobile : +31 653 211 303 E-mail : hak@polyganics.com
Date Prepared:	May 20, 2003
General Provisions:	Trade Name: Neurolac® Nerve guide Common Name: Nerve guide Classification Name: Nerve Cuff, 21 CFR 882.5275 Device Classification: Class II
Predicate Devices:	• Neurotube™ Neuroregen L.L.C. K983007 • NeuroGen™ Integra Life Sciences Corp. K011168
Performance Standards	For the Nerve Cuff performance, the FDA, under section 514 of the Food, Drug and Cosmetic Act, has not established standards.
Indications for Use	The Neurolac® nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve. The use of a Neurolac nerve guide is contraindicated in patients with known hypersensitivity or allergies to its components.

Device Description

Neurolac® is designed to be a flexible and transparent resorbable poly(DL-lactide-co-ε-caprolactone) tube to provide a protective environment for peripheral nerve regeneration after injury and to create a conduit to guide axonal growth across a nerve gap.

Neurolac® nerve guides are provided sterile in Tyvek pouch packages and retainer in a variety of sizes.

Performance Data:

The safety and effectiveness of the Neurolac nerve guides have been demonstrated via data collected from design verification tests and analyses. The design verification testing consisted of the following:

- In vitro suture retention testing
- In vitro degradation testing
- In vivo nerve function recovery

Summary of Substantial Equivalence

The design, fundamental technology and intended use (safety and efficacy) featured with the Neurolac® Nerve Guide are substantially equivalent to those featured with the competitor devices Neurotube™ (ref. 510(k) 983007; Neuroregen L.L.C.) and the NeuroGen™ Nerve Guide (ref. 510(k) 011168; Integra Life Sciences Corporation).

Biocompatibility, mechanical and physical property testing, in vitro degradation testing, and performance testing in an animal model provide reasonable scientific evidence that Neurolac® nerve guide is substantially equivalent to the predicate devices. Evaluation of the Polyganics Neurolac® Nerve guide based on biocompatibility testing, animal tests, results from literature and the comparison of the Neurolac® nerve guide with its predicate devices, shows that the Neurolac® nerve guide is safe for implantation.

APPENDIX B: DEVICE DRAWING

(b) (4)

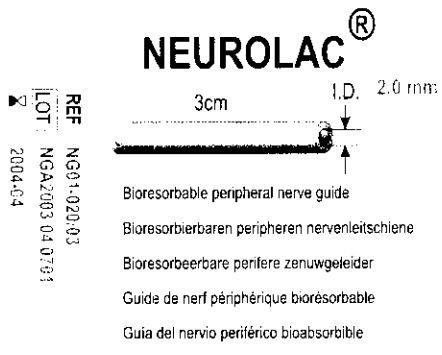
APPENDIX C: DEVICE LABELING

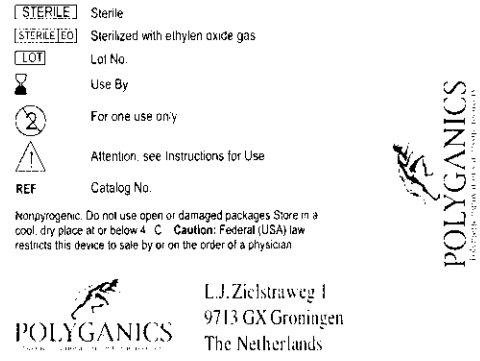
Subject device: Neurolac Nerve Guide

DRAFT

DEVICE LABELING

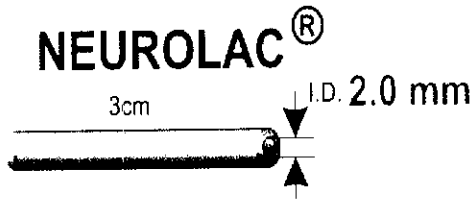
Carton, DRAFT





DEVICE LABELING

Inner label pouch, DRAFT



Bioresorbable peripheral nerve guide

Bioresorbierbaren peripheren nervenleitschiene

Bioresorbeerbare perifere zenuwgeleider

Guide de nerf périphérique biorésorbable

Guia del nervio periférico bioabsorbible

STERILE

STERILE EO

2

REF NG01-020/03

LOT NGA2003 04 2501

2004-04

Nonpyrogenic. Do not use open or damaged packages. Store in a cool, dry place at or below 4 °C. **Caution:** Federal (USA) law restricts this device to sale by or on the order of a physician

POLYGANICS

L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

DEVICE LABELING

Instructions for Use, DRAFT

PG002a 2003-01-09 MM024 IFU EN version 19

POLYGANICS

ıstructions for Use, English

:TERILE. Sterilized with ethylene oxide gas. For single use nly. Do not autoclave.
:AUTION: Federal (USA) law restricts this device to sale by r on the order of a physician.

leurolac® peripheral nerve guide

lescription

he Neurolac® nerve guide is composed of the bioresorbable opolyester poly(DL-lactide-ε-caprolactone). The Neurolac nerve uide provides guidance and protection to regenerating axons, nd prevents ingrowth of fibrous tissue into the nerve gap during erve regeneration from the proximal to the distal nerve stump of ıe transected nerve.
he Neurolac nerve guide elicits a minimal acute inflammatory eaction of the surrounding tissue, which is followed by gradual ncapsulation of the tube by fibrous tissue. Degradation of the leurolac nerve guide occurs through hydrolysis leading to radual reduction of molecular weight. The Neurolac nerve guide etains its initial mechanical properties up to 8 weeks, whereafter apid loss of mechanical strength and gradual mass loss occur. he final degradation products, lactic acid and ω-hydroxy hexaoic acid, are resorbed, metabolized and excreted by the body. nimal studies demonstrated that a Neurolac nerve guide is esorbed within 16 months.

he Neurolac nerve guide inner diameter is indicated on the abel, and is packed in a tray placed in a Tyvek pouch. The ieurolac nerve guide is indicated for single-use.

ndications

he Neurolac nerve guide is indicated for the reconstruction of a eripheral nerve discontinuity up to 20 mm in patients who have ustained a complete division of a nerve.

:ontraindications

he use of a Neurolac nerve guide is contraindicated in patients /ith known hypersensitivity or allergies to its components.

Varnings

The Neurolac nerve guide is for single use only. Do not resterilize or re-use. Structural integrity and/or function may be impaired through cleaning, resterilization, or re-use and may cause adverse patient reactions. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from re-use of (or any part of) the Neurolac nerve guide.
Sterile unless package has been opened or damaged. Discard open unused nerve guides.
The Neurolac nerve guide should only be used by physicians who are trained in nerve defect repair techniques. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from use by untrained personnel. The physician should consult recent literature on current medical practice on peripheral nerve repair.
Persons with allergic reactions to the biodegradable material or breakdown products may suffer an allergic response to this implant.
Nerve regeneration may be suboptimal in elderly, malnourished or debilated patients or in patients suffering from cancer, anaemia, obesity, diabetes, infection or other conditions which may delay wound healing, infected wounds, or moderate tissue inflammatory response characteristic of foreign body response.

Precautions

- Use prior to "Use by date";
- Store in dark, dry place at or below 4°C (39°F);
- Do not expose the nerve guide to organic solvents (e.g. chloroform, acetone);
- Do not use absorbable sutures for fixation of the nerve stumps into the nerve guide;
- Avoid crushing, crimping, kinking or other damage due to application of surgical instruments such as forceps, needle-holders and scissors or during handling of the device;
- Avoid tension on the nerve ends;
- Prevent compression and/or kinking of the Neurolac after the procedure. The use of a protective splint is recommended.

Adverse effects

Adverse events associated with the use of a Neurolac® nerve guide may include but are not limited to:

- Failure to provide adequate nerve regeneration at sites where too much tension or compression occurs;
- Failure to provide adequate/complete nerve regeneration
- Transitory local irritation
- Infection
- Allergy
- Delayed wound healing

Opening of the package

The pouch is opened in such a way that the tray remains sterile. The tray can be opened by sliding the lid. By clasping the nerve guide at one of its ends between a pair of tweezers, it can be taken from the tray. The lid contains a ruler that may be used as a reference to estimate the gap length or nerve stump diameter.

Surgical Procedure

1. Surgically expose the injured nerve.
2. Resect the injured segment distally and proximally until a nerve stump is identified with no residual intrafascicular scarring.

NOTE: Do not crush the nerve stumps as this can cause extrusion of intra-fascicular components.

3. Measure the length of the defect with all joints in an extended position.
4. If the gap length is between 0 and 20 mm, the injured nerve can be reconstructed with a Neurolac nerve guide.
5. Select the Neurolac nerve guide with the proper internal diameter.

NOTE: It is essential that the internal nerve guide diameter is slightly larger than the diameter of the transected nerve to guarantee optimal nerve regeneration.

6. Cut the selected nerve guide with a pair of scissors or a knife so that the nerve guide is 1 cm longer than the nerve gap.

Under some circumstances immobilization of the nerve ends, as to avoid tension on the nerve ends, may be employed at the discretion of the surgeon. To secure adequate fixation of the nerve ends in the nerve guide, the accepted surgical technique of flat, square ties with additional throws as warranted by surgical circumstance and the experience of the surgeon, is required.

Suturing Technique

1. Place the Neurolac nerve guide in warm saline (37°C) for approximately 1 minute before implantation. This will make the tube more flexible and ease needle passage during suturing.
2. Suture the Neurolac nerve guide by passing the suture (8-0 suture) first through the tube from the outside to the inside and then transversally and superficially through the epineurium and back through the tube from the inside to the outside, after which a tie is made (Fig. 1.1-1.3).
3. When positioning optimization of the nerve ends in the nerve guide is required, it is recommended to place a second suture in the same nerve end (Fig. 1.4).
4. Pull the proximal nerve stump into the nerve guide.

NOTE: It is recommended that the nerve ends are pulled into the tube for at least 3 mm for optimal nerve regeneration.

5. Fill the tube with heparinized saline, using a solution containing 1000 units of heparin per 100 ml of normal saline (Fig 1.5).
6. Subsequently, use the same procedure, to pull the distal nerve stump into the nerve guide.
7. A minimum space of 5 mm should be left between the nerve ends in the nerve guide.
8. Fill any remaining space with heparinized saline (Fig 1.6) by injecting along the nerve into the lumen of the tube or by penetrating the tube (not the nerve).

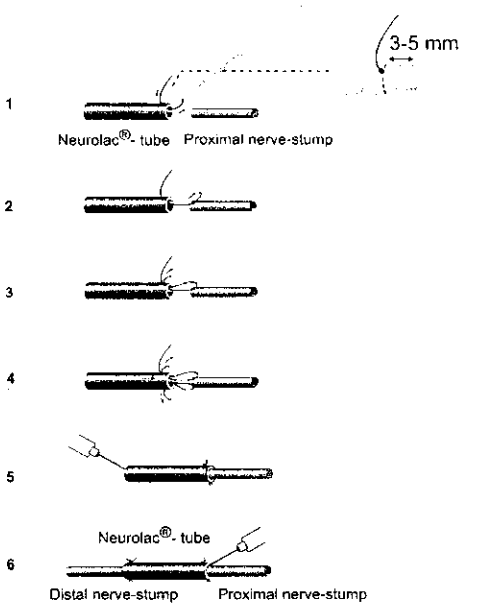


Figure 1. Schematic representation of suture technique for suturing the nerve ends into the nerve guide.

CAUTION: Ensure that no blood enters the nerve guide lumen since this may hinder nerve recovery.
CAUTON: The nerve guide should be implanted and sutured with all joints in an extended position as to assure that no tension occurs on the proximal or distal nerve end when joints are being mobilized.

9. Close the wound and splint to prevent kinking for the first three postoperative weeks. Long-term compression of the nerve guide should be avoided. Patients may be administered oral antibiotics for the first post-operative week.

POLYGANICS

Dispose contaminated implantation and packaging materials utilizing standard hospital procedures and universal precautions for bio-hazardous waste.

⚠	=	Refer to accompanying instructions for use.
⧗	=	Use by
REF	=	Catalog number
2	=	For one use only
LOT	=	Lot number
STERILE	=	Sterile product
STERILE | EO	=	Sterilized by ethylene oxide

Polyganics BV
L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands
Telephone +31 50 588 6588
Fax +31 50 588 6599

DISCLAIMER OF WARRANTY AND LIMITATION OF REMEDY
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Polyganics BV will not be responsible for any direct, incidental, or consequential damages resulting from reuse of the product.

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APPENDIX D: PREDICATE DEVICE NEUROTUBE™

Neuroregen L.L.C.

510(k): K983007

3/22/99

K983007

PREMARKET NOTIFICATION [510(K)] SUMMARY
(as required by 21CFR 807.92(a))

Submitted by: John E. Barham, Managing Member, Neuroregen L.L.C.
43 N. Bond Street, Bel Air, MD 21014
Phone 410 838-8090 Fax 410 838-8092
Date: August 28, 1998

Trade Name: Neurotube™

Common Name: Nerve Conduit

Classification Name: Nerve Cuff (per 21 CFR Section 882.5275)

Equivalent Device: Silicone Nerve Cuffs

Description: The Neurotube is a woven, flexible, polyglycolic acid tube which has been heat treated to achieve a configuration corrugated externally for wall strength. The tube is 2.3 mm in diameter and 4 cm in length.

Intended Use: The tube provides an optimal environment for longitudinal nerve axon growth of the peripheral nerve. For single use only in patients with a peripheral nerve injury where the nerve gap is more than or equal to 8 mm, but less than or equal to 3 cm.

Technological Characteristics Compared to Predicate Device: The Neurotube is fabricated from a bioresorbable material in contrast to nonresorbable silicone and thus precludes the need for a second surgery. Both the silicone and bioresorbable products are tubular in design to facilitate nerve regeneration.

Clinical Data: Clinical trials for the Neurotube were conducted in the United States over a period of three and one half years to support a determination of substantial equivalence.. A total of 98 subjects were enrolled at five clinical trial sites. One hundred two nerve reconstructions were evaluated. There were 56 in the control group using classic end-to-end nerve graft repairs and 46 received the Neurotube. Subjects were given sensory evaluations at 3, 6, 9, and 12 month intervals. Static and moving sensory discrimination tests were performed. Results were equivalent between the two groups. The only adverse effects reported were delayed healing of a skin closure and skin separation with partial extrusion of the Neurotube. The study indicated that a single stage, biodegradable, polyglycolic acid conduit can be used as an alternative to a nerve graft or a biodurable nerve tube.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

MAR 2 2 1999

Mr. John E. Barham
Managing Member
Neuroregen, L.L.C.
43 North Bond Street
Bel Air, Maryland 21014

Re: K983007
Trade Name: Neurotube™
Regulatory Class: II
Product Code: JXI
Dated: December 18, 1998
Received: December 22, 1998

Dear Mr. Barham:

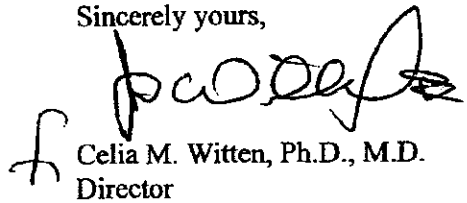
We have reviewed your Section 510(k) notification of intent to market the device referenced above and we have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to devices marketed in interstate commerce prior to May 28, 1976, the enactment date of 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). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (Premarket Approval), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 895. A substantially equivalent determination assumes compliance with the current Good Manufacturing Practice requirement, as set forth in the Quality System Regulation (QS) for Medical Devices: General regulation (21 CFR Part 820) and that, through periodic (QS) inspections, the Food and Drug Administration (FDA) will verify such assumptions. Failure to comply with the GMP regulation may result in regulatory action. In addition, FDA may publish further announcements concerning your device in the Federal Register. Please note: this response to your premarket notification submission does not affect any obligation you might have under sections 531 through 542 of the Act for devices under the Electronic Product Radiation Control provisions, or other Federal laws or regulations.

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

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4595. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its internet address "http://www.fda.gov/cdrh/dsmamain.html".

Sincerely yours,



Celia M. Witten, Ph.D., M.D.
Director
Division of General and
Restorative Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

K983007

510 (k) Number K983007

Device Name: Neurotube™

Indications for Use:

The Neurotube is intended for single use in patients with an injury to a peripheral nerve, in which the nerve gap is more than or equal to 8 mm but less than or equal to 3 cm. The nerve gap may be created primarily at the time of injury or created secondarily at the time of exploration of failed primary repair.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

Prescription Use X
(Per 21 CRF 801.109)

(Division Sign-Off)
Division of General Restorative Devices
510(k) Number K983007

JUN 2 2 2001

NeuroGen™ Nerve Guide

510(K) SUMMARY

Submitter's name and address:

Integra LifeSciences Corporation
105 Morgan Lane
Plainsboro, NJ 08536 USA

Contact person and telephone number:

Judith E. O'Grady
Senior Vice President, Regulatory Affairs, Quality Assurance and Clinical Research
(609) 275-0500

Date Summary was prepared:

April 16, 2001

Name of the device:

Proprietary Name:	NeuroGen™
Common Name:	Nerve Guide
Classification Name:	Nerve Cuff, Product Code 84JXI

Substantial Equivalence:

NeuroGen™ Nerve Guide is substantially equivalent in function and intended use to the following products which have been cleared to market under Premarket Notifications 510(k): Salumedica™ Nerve Cuff, NeuroTube® and Fastube™ Nerve Cuff.

Device Description:

NeuroGen™ Nerve Guide is an implant designed for repair of peripheral nerve discontinuities. NeuroGen™ Nerve Guide provides a protective environment for peripheral nerve repair after injury. NeuroGen™ Nerve Guide is designed to be an interface between the nerve and surrounding tissue and to create a conduit for axonal growth across a nerve gap.

NeuroGen™ Nerve Guide is flexible to accommodate movement of joint and associated tendons while retaining its shape and is resistant to occlusive forces from surrounding tissue. When hydrated, NeuroGen™ is an easy to handle, soft, pliable, nonfriable, porous collagen tube. NeuroGen™ Nerve Guides are provided sterile in double blister packages in a variety of sizes.

Intended Use:

NeuroGen™ Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Safety

Biocompatibility studies have demonstrated NeuroGen™ Nerve Guides to be: noncytotoxic, nonpyrogenic, nonirritating, and nonsensitizing. The following studies were conducted:

a) Cytotoxicity
b) Irritation / Intracutaneous Reactivity
c) Sensitization
d) Acute Systemic Toxicity
e) Subchronic Toxicity
f) Chronic Toxicity
g) Genotoxicity
h) Implantation
i) Hemolysis

Performance Characteristics:

The effectiveness of NeuroGen™ Nerve Guide to repair peripheral nerve discontinuities was studied in a long-term (3.5 years) primate study and in rodent animal models. The studies demonstrated that NeuroGen™ Nerve Guides are substantially equivalent to nerve graft, direct suture and silicone tubes.

The mechanical and physical characteristics of the NeuroGen™ Nerve Guides were evaluated in a series of tests. These tests were conducted to ensure that the NeuroGen™ Nerve Guides possess the mechanical properties (suture retention and mechanical compression) as well as physical properties (porosity and permeability) that determine their suitability for use in the human body. Testing has demonstrated that the nerve guides are able to hold a suture, resist repeated compression from surrounding tissues, have a porous outer surface and tube wall, and allow the passage of molecules of specific size through the tube wall.

Technological Characteristics Compared to Predicate Devices:

NeuroGen™ Nerve Guide is a tubular device which is equivalent to the predicate devices, Salumedica™ Nerve Cuff, NeuroTube® and Fastube™ Nerve Cuff in its design for repair of peripheral nerve discontinuities. Like the predicate devices, NeuroGen™ is provided sterile, for single use only. The NeuroGen™ Nerve Guide is manufactured from a bioresorbable material, as is one of the predicate devices, NeuroTube®. NeuroGen™ Nerve Guide meets ISO 10993 requirements for Biocompatibility testing.

Conclusion

NeuroGen™ Nerve Guide is indicated for the repair of nerve discontinuities where gap closure can be achieved by flexion of the extremity. NeuroGen™ Nerve Guide is flexible to accommodate movement of joint and associated tendons while retaining its shape and is resistant to occlusive forces from surrounding tissue.

Biocompatibility studies have demonstrated NeuroGen™ Nerve Guide to be non-cytotoxic, non-sensitizing, non-toxic and non-mutagenic. Extensive, long-term evaluations in primates demonstrates NeuroGen™ Nerve Guide to biocompatible and provides an environment for axonal growth.

Valid scientific evidence through substantial testing of descriptive characteristics, Biocompatibility, mechanical and physical property testing and extensive performance testing in a primate model, provide reasonable assurance that NeuroGen™ Nerve Guide is safe and effective under the proposed conditions of use, and substantially equivalent to its predicate devices.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

JUN 2 2 2001

Ms. Judith E. O'Grady, RN, MSN
Senior Vice President, Regulatory Affairs,
Quality Assurance and Clinical Affairs
Integra Life Sciences Corporation
105 Morgan Lane
Plainsboro, New Jersey 08536

Re: K011168
Trade/Device Name: NeuroGen Nerve Guide
Regulation Number: 882.5275
Regulatory Class: II
Product Code: JXI
Dated: April 16, 2001
Received: April 17, 2001

Dear Ms. O'Grady:

We have reviewed your Section 510(k) notification of intent to market the device referenced above and we 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). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (Premarket Approval), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 895. A substantially equivalent determination assumes compliance with the Current Good Manufacturing Practice requirements, as set forth in the Quality System Regulation (QS) for Medical Devices: General regulation (21 CFR Part 820) and that, through periodic QS inspections, the Food and Drug Administration (FDA) will verify such assumptions. Failure to comply with the GMP regulation may result in regulatory action. In addition, FDA may publish further announcements concerning your device in the Federal Register. Please note: this response to your premarket notification submission does not affect any obligation you might have under sections 531 through 542 of the Act for devices under the Electronic Product Radiation Control provisions, or other Federal laws or regulations.

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

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4659. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its internet address "http://www.fda.gov/cdrh/dsma/dsmamain.html".

Sincerely yours,

for Mark N Melkerson

Celia M. Witten, Ph.D., M.D.
Director
Division of General, Restorative
and Neurological Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

510(k) Number: K011168

Device Name: NeuroGen™ Nerve Guide

Indications for Use

NeuroGen™ Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

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

(Concurrence of CDRH, Office of Device Evaluation (ODE)

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

for Mark N Milhous

(Division Sign-Off)
Division of General, Restorative
and Neurological Devices

510(k) Number K011168

E-0001

APPENDIX E: PREDICATE DEVICE NEUROGEN™

Integra Life Sciences Corporation

510(k): K011168

JUN 2 2 2001

NeuroGen™ Nerve Guide

510(K) SUMMARY

Submitter's name and address:

Integra LifeSciences Corporation
105 Morgan Lane
Plainsboro, NJ 08536 USA

Contact person and telephone number:

Judith E. O'Grady
Senior Vice President, Regulatory Affairs, Quality Assurance and Clinical Research
(609) 275-0500

Date Summary was prepared:

April 16, 2001

Name of the device:

Proprietary Name:	NeuroGen™
Common Name:	Nerve Guide
Classification Name:	Nerve Cuff, Product Code 84JXI

Substantial Equivalence:

NeuroGen™ Nerve Guide is substantially equivalent in function and intended use to the following products which have been cleared to market under Premarket Notifications 510(k): Salumedica™ Nerve Cuff, NeuroTube® and Fastube™ Nerve Cuff.

Device Description:

NeuroGen™ Nerve Guide is an implant designed for repair of peripheral nerve discontinuities. NeuroGen™ Nerve Guide provides a protective environment for peripheral nerve repair after injury. NeuroGen™ Nerve Guide is designed to be an interface between the nerve and surrounding tissue and to create a conduit for axonal growth across a nerve gap.

NeuroGen™ Nerve Guide is flexible to accommodate movement of joint and associated tendons while retaining its shape and is resistant to occlusive forces from surrounding tissue. When hydrated, NeuroGen™ is an easy to handle, soft, pliable, nonfriable, porous collagen tube. NeuroGen™ Nerve Guides are provided sterile in double blister packages in a variety of sizes.

Intended Use:

NeuroGen™ Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

Safety

Biocompatibility studies have demonstrated NeuroGen™ Nerve Guides to be: noncytotoxic, nonpyrogenic, nonirritating, and nonsensitizing. The following studies were conducted:

a) Cytotoxicity
b) Irritation / Intracutaneous Reactivity
c) Sensitization
d) Acute Systemic Toxicity
e) Subchronic Toxicity
f) Chronic Toxicity
g) Genotoxicity
h) Implantation
i) Hemolysis

Performance Characteristics:

The effectiveness of NeuroGen™ Nerve Guide to repair peripheral nerve discontinuities was studied in a long-term (3.5 years) primate study and in rodent animal models. The studies demonstrated that NeuroGen™ Nerve Guides are substantially equivalent to nerve graft, direct suture and silicone tubes.

The mechanical and physical characteristics of the NeuroGen™ Nerve Guides were evaluated in a series of tests. These tests were conducted to ensure that the NeuroGen™ Nerve Guides possess the mechanical properties (suture retention and mechanical compression) as well as physical properties (porosity and permeability) that determine their suitability for use in the human body. Testing has demonstrated that the nerve guides are able to hold a suture, resist repeated compression from surrounding tissues, have a porous outer surface and tube wall, and allow the passage of molecules of specific size through the tube wall.

Technological Characteristics Compared to Predicate Devices:

NeuroGen™ Nerve Guide is a tubular device which is equivalent to the predicate devices, Salumedica™ Nerve Cuff, NeuroTube® and Fastube™ Nerve Cuff in its design for repair of peripheral nerve discontinuities. Like the predicate devices, NeuroGen™ is provided sterile, for single use only. The NeuroGen™ Nerve Guide is manufactured from a bioresorbable material, as is one of the predicate devices, NeuroTube®. NeuroGen™ Nerve Guide meets ISO 10993 requirements for Biocompatibility testing.

Conclusion

NeuroGen™ Nerve Guide is indicated for the repair of nerve discontinuities where gap closure can be achieved by flexion of the extremity. NeuroGen™ Nerve Guide is flexible to accommodate movement of joint and associated tendons while retaining its shape and is resistant to occlusive forces from surrounding tissue.

Biocompatibility studies have demonstrated NeuroGen™ Nerve Guide to be non-cytotoxic, non-sensitizing, non-toxic and non-mutagenic. Extensive, long-term evaluations in primates demonstrates NeuroGen™ Nerve Guide to biocompatible and provides an environment for axonal growth.

Valid scientific evidence through substantial testing of descriptive characteristics, Biocompatibility, mechanical and physical property testing and extensive performance testing in a primate model, provide reasonable assurance that NeuroGen™ Nerve Guide is safe and effective under the proposed conditions of use, and substantially equivalent to its predicate devices.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

JUN 2 2 2001

Ms. Judith E. O'Grady, RN, MSN
Senior Vice President, Regulatory Affairs,
Quality Assurance and Clinical Affairs
Integra Life Sciences Corporation
105 Morgan Lane
Plainsboro, New Jersey 08536

Re: K011168
Trade/Device Name: NeuroGen Nerve Guide
Regulation Number: 882.5275
Regulatory Class: II
Product Code: JXI
Dated: April 16, 2001
Received: April 17, 2001

Dear Ms. O'Grady:

We have reviewed your Section 510(k) notification of intent to market the device referenced above and we 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). 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.

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If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4659. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its internet address "http://www.fda.gov/cdrh/dsma/dsmamain.html".

Sincerely yours,

for Mark N Melkerson

Celia M. Witten, Ph.D., M.D.
Director
Division of General, Restorative
and Neurological Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

510(k) Number: K011168

Device Name: NeuroGen™ Nerve Guide

Indications for Use

NeuroGen™ Nerve Guide is indicated for repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity.

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

(Concurrence of CDRH, Office of Device Evaluation (ODE)

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

for Mark N Milhous

(Division Sign-Off)
Division of General, Restorative
and Neurological Devices

510(k) Number K011168

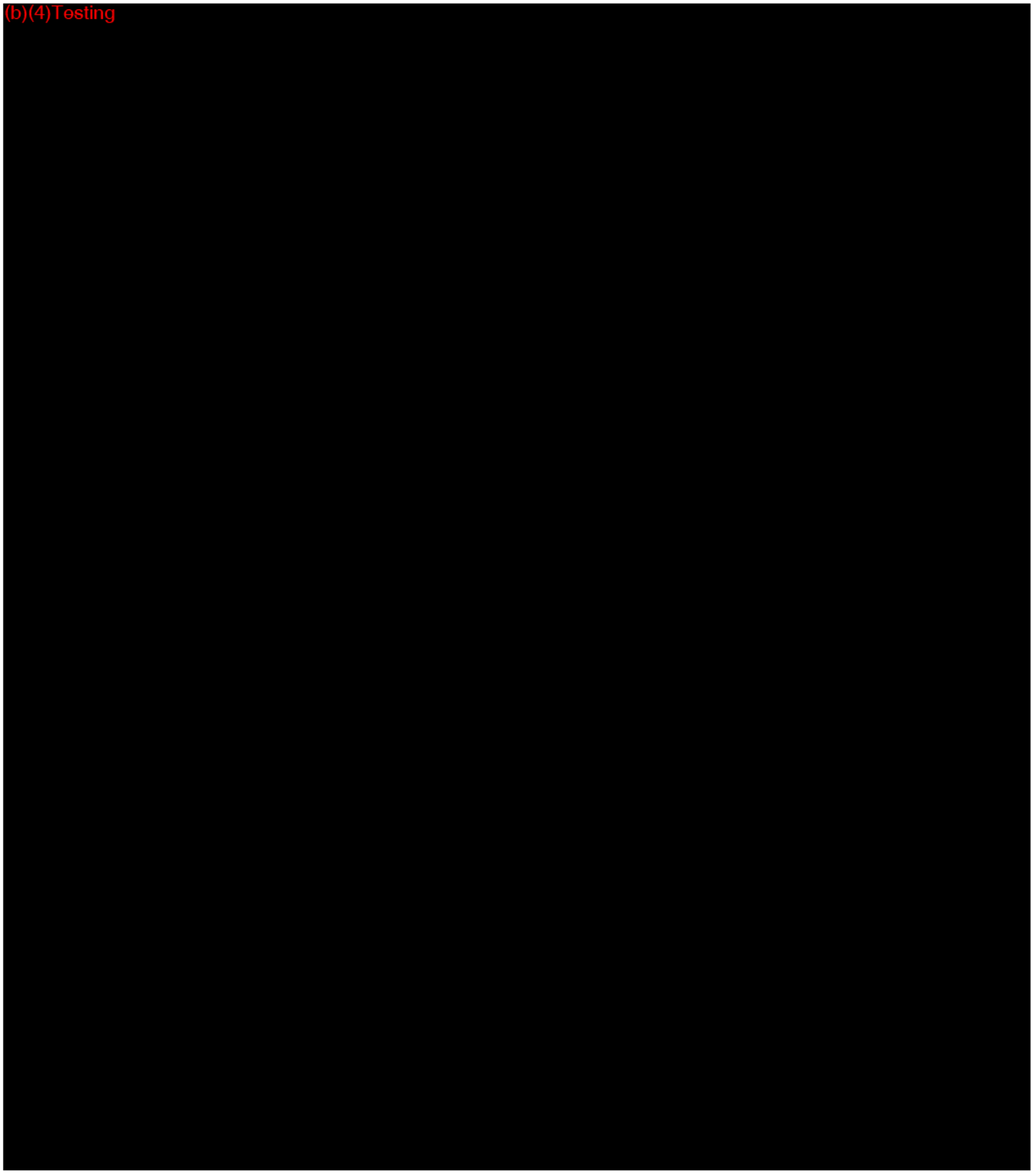
E-0001

APPENDIX F: PERFORMANCE TEST REPORTS

Suture retention testing
In vitro degradation testing
Nerve function recovery: sciatic nerve model
Neurolac nerve guide versus autologous nerve graft
Functional nerve recovery after bridging a 15 mm nerve gap with a Neurolac nerve guide

Suture retention testing

(b)(4)Testing



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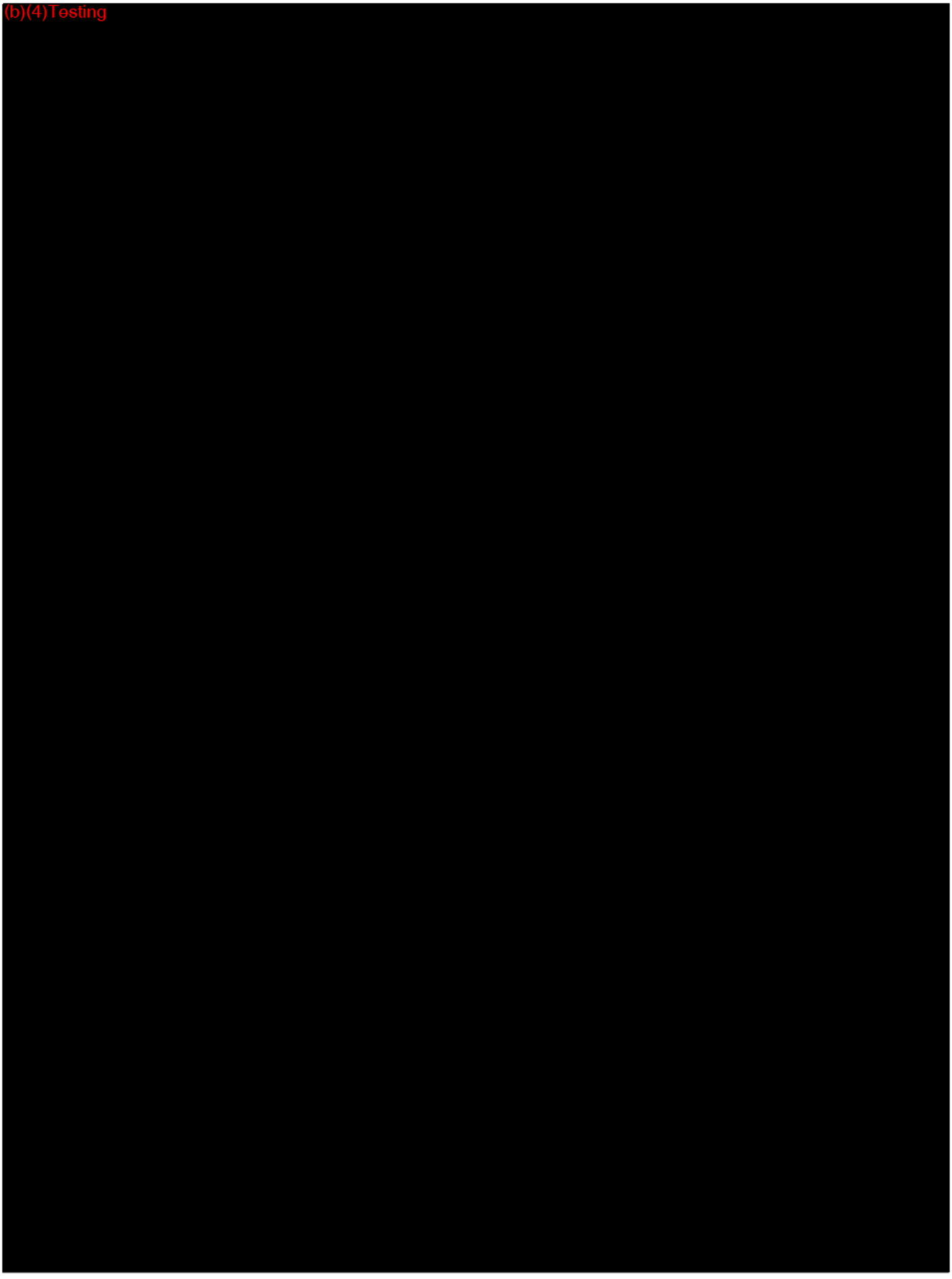
(b)(4)Testing

(b)(4)Testing



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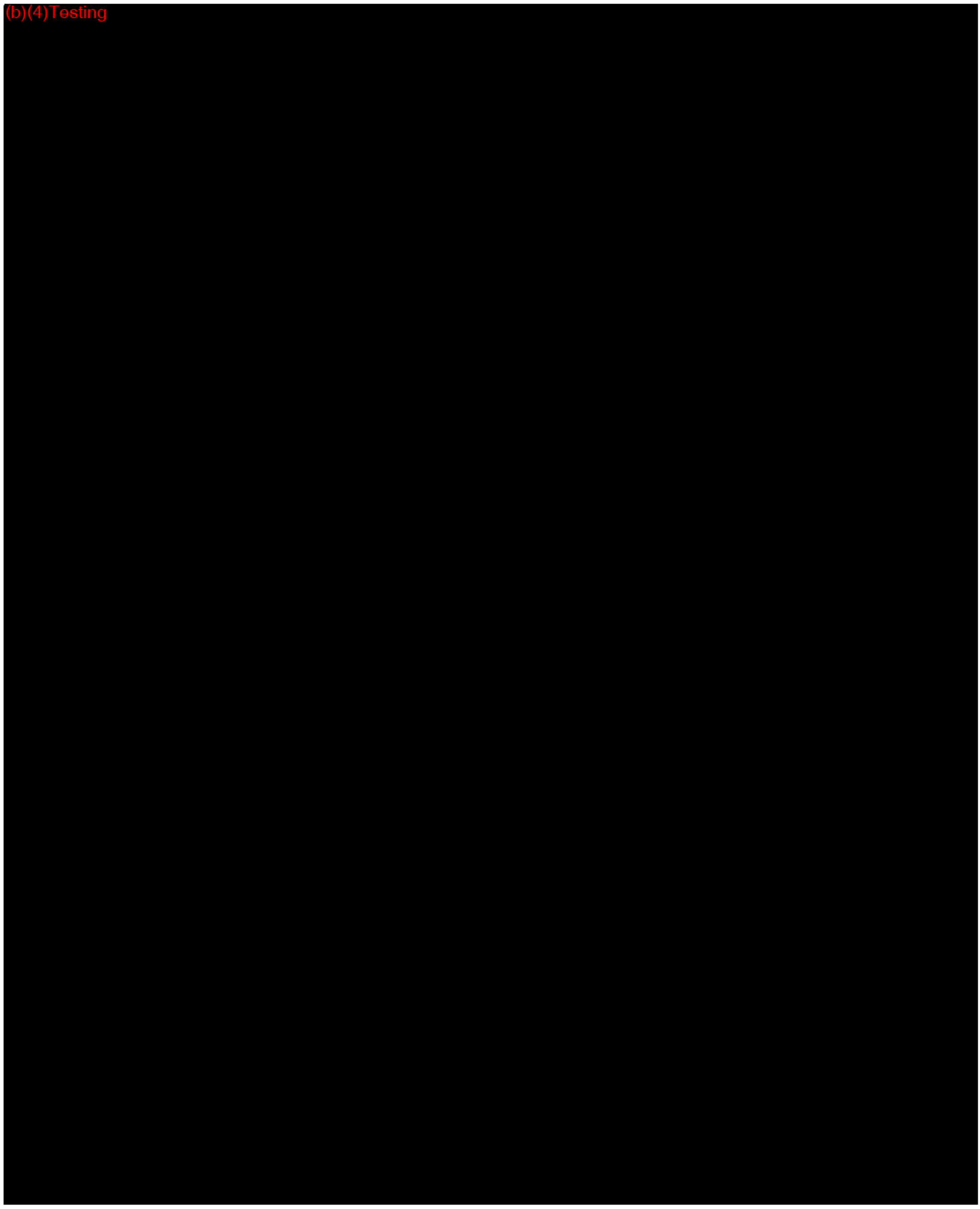
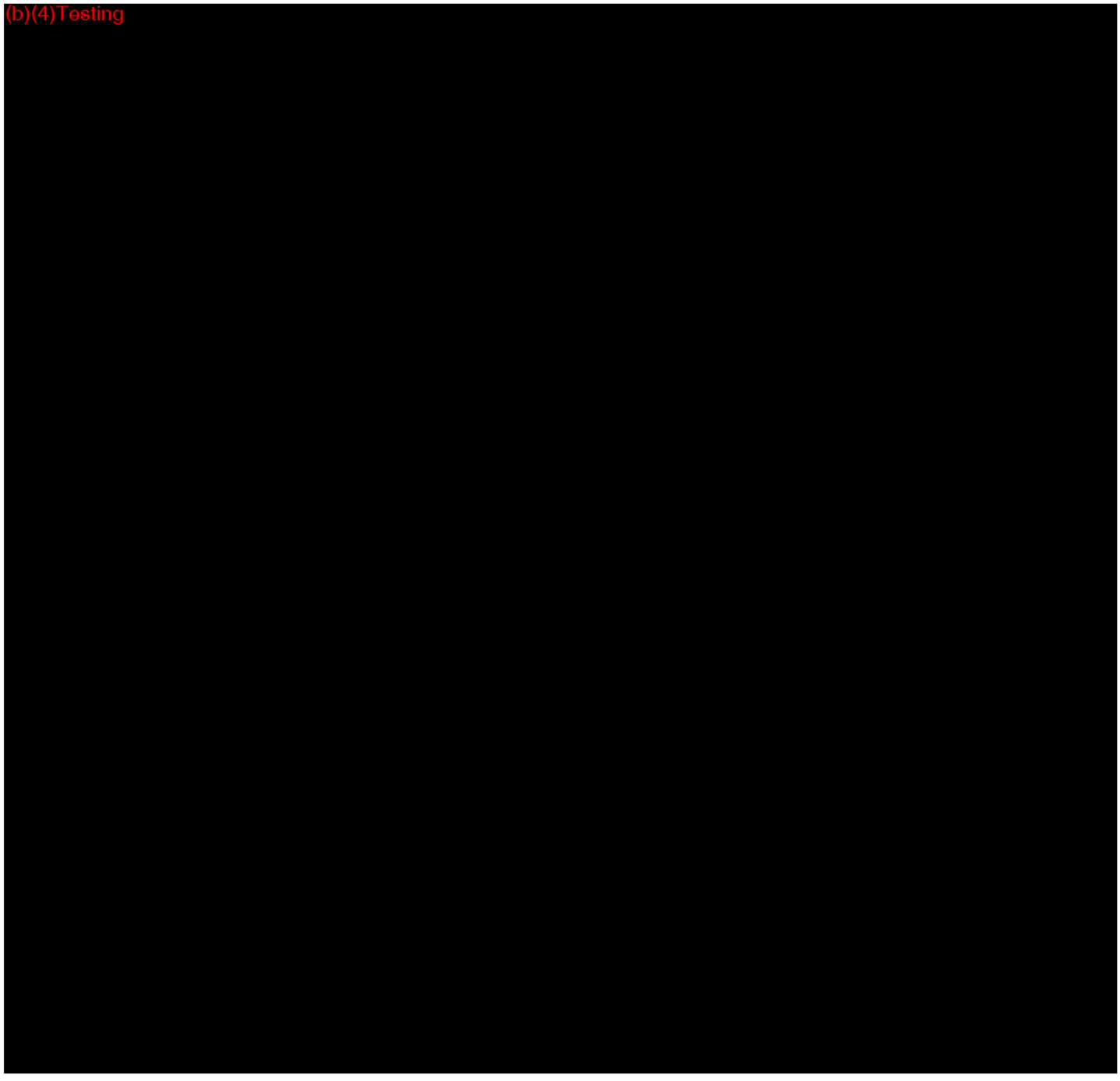


In vitro degradation testing

(b)(4)Testing

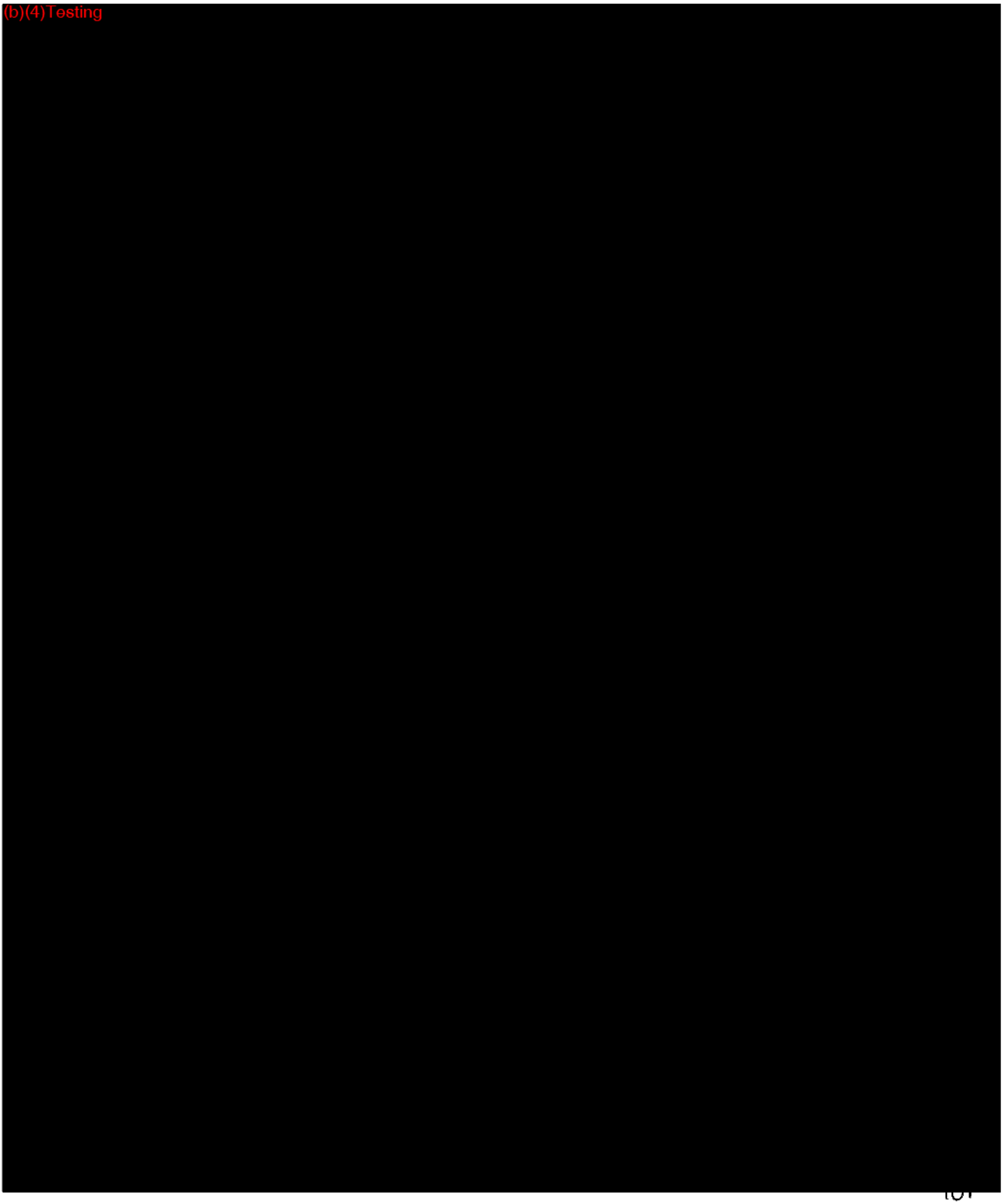
[redacted]

(b)(4)Testing



Contents

(b)(4)Testing



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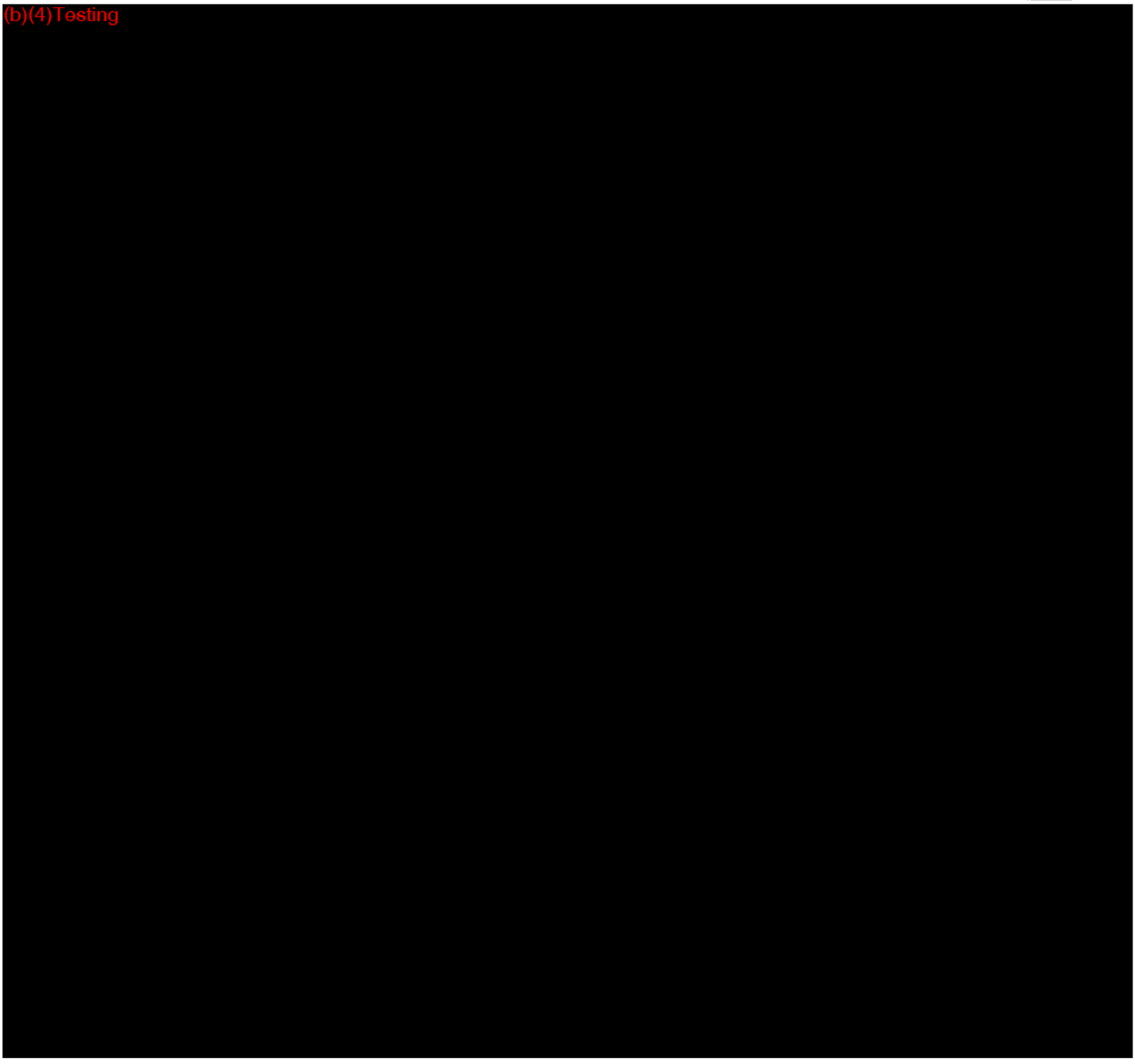

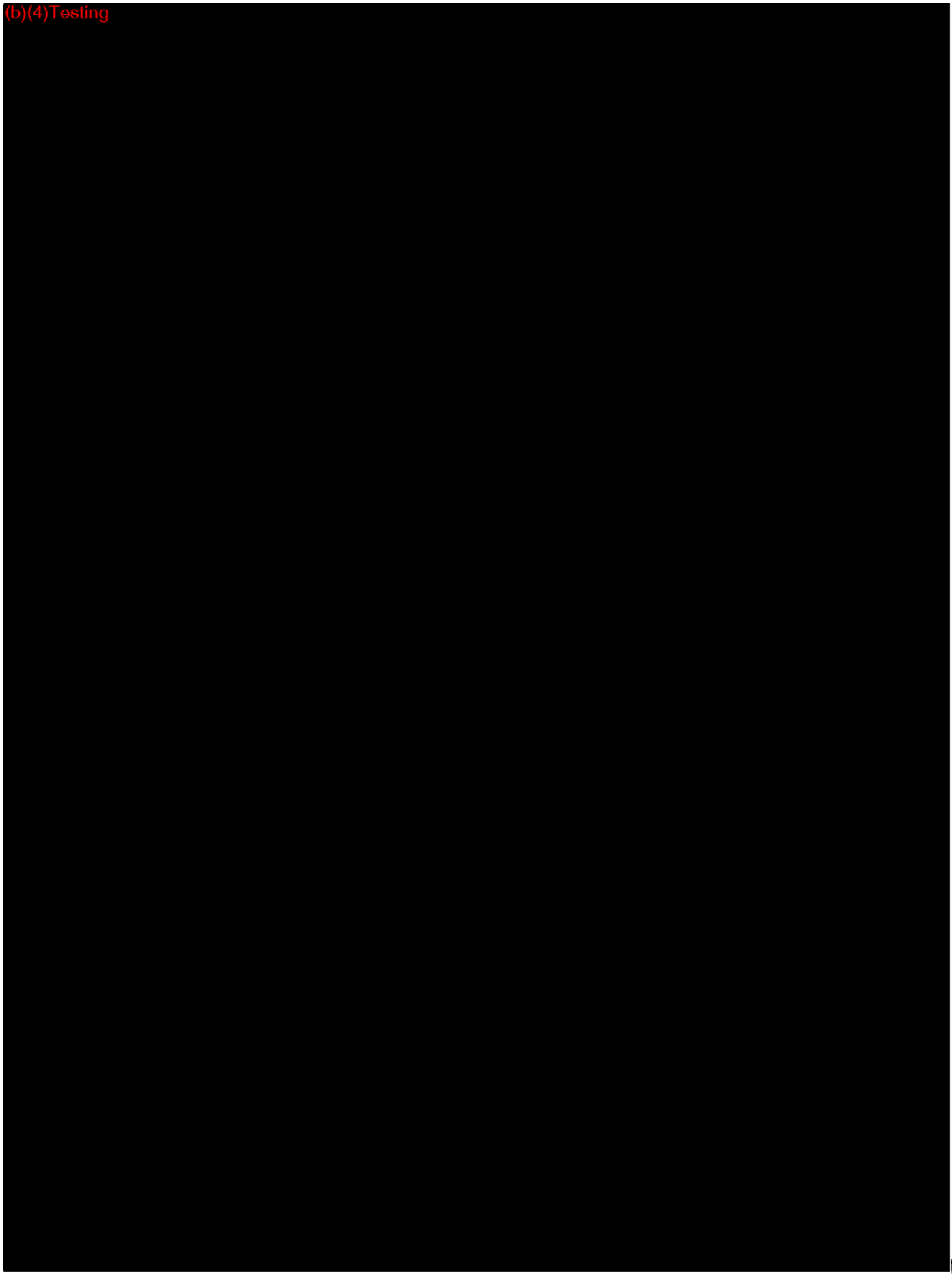
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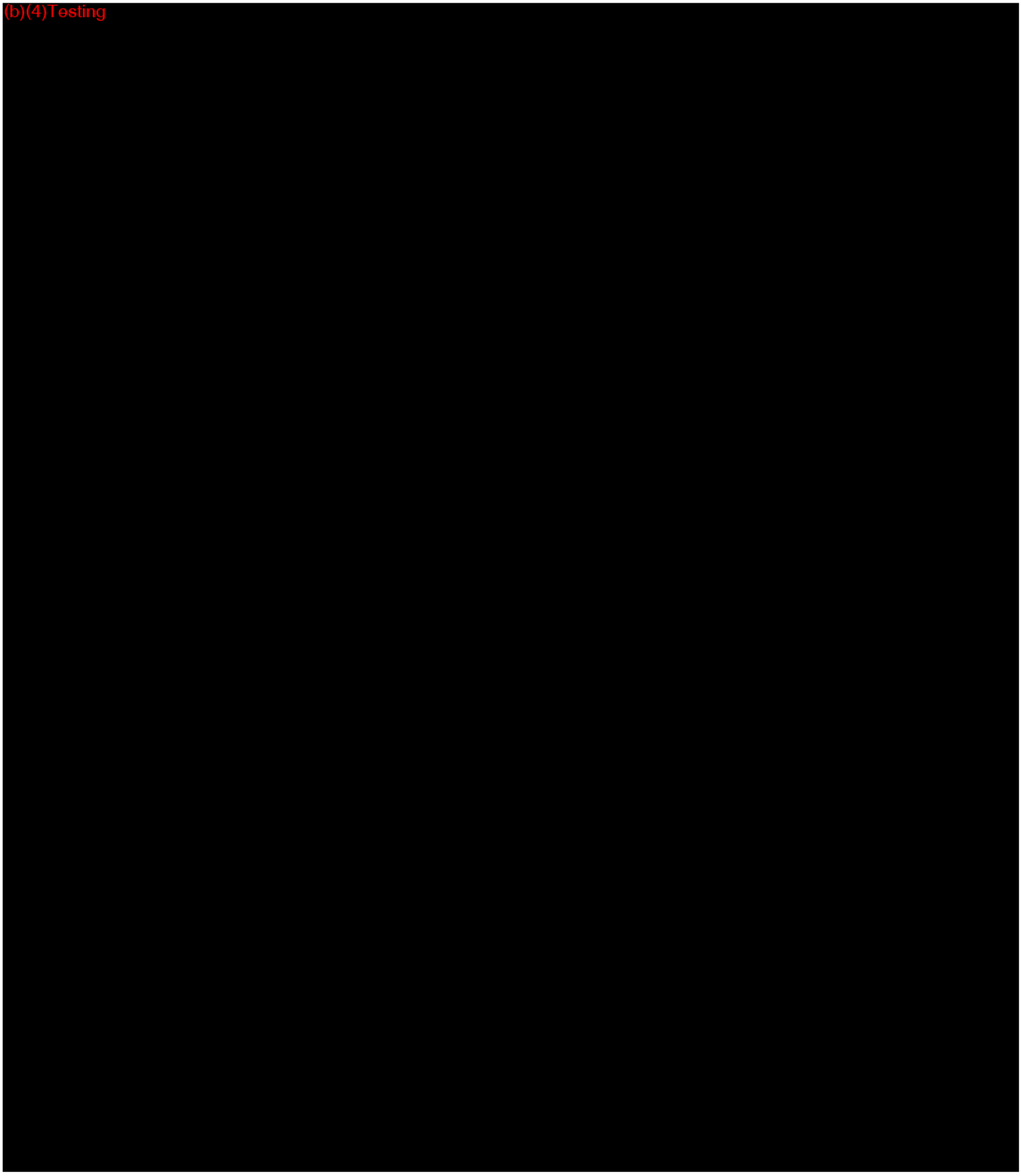

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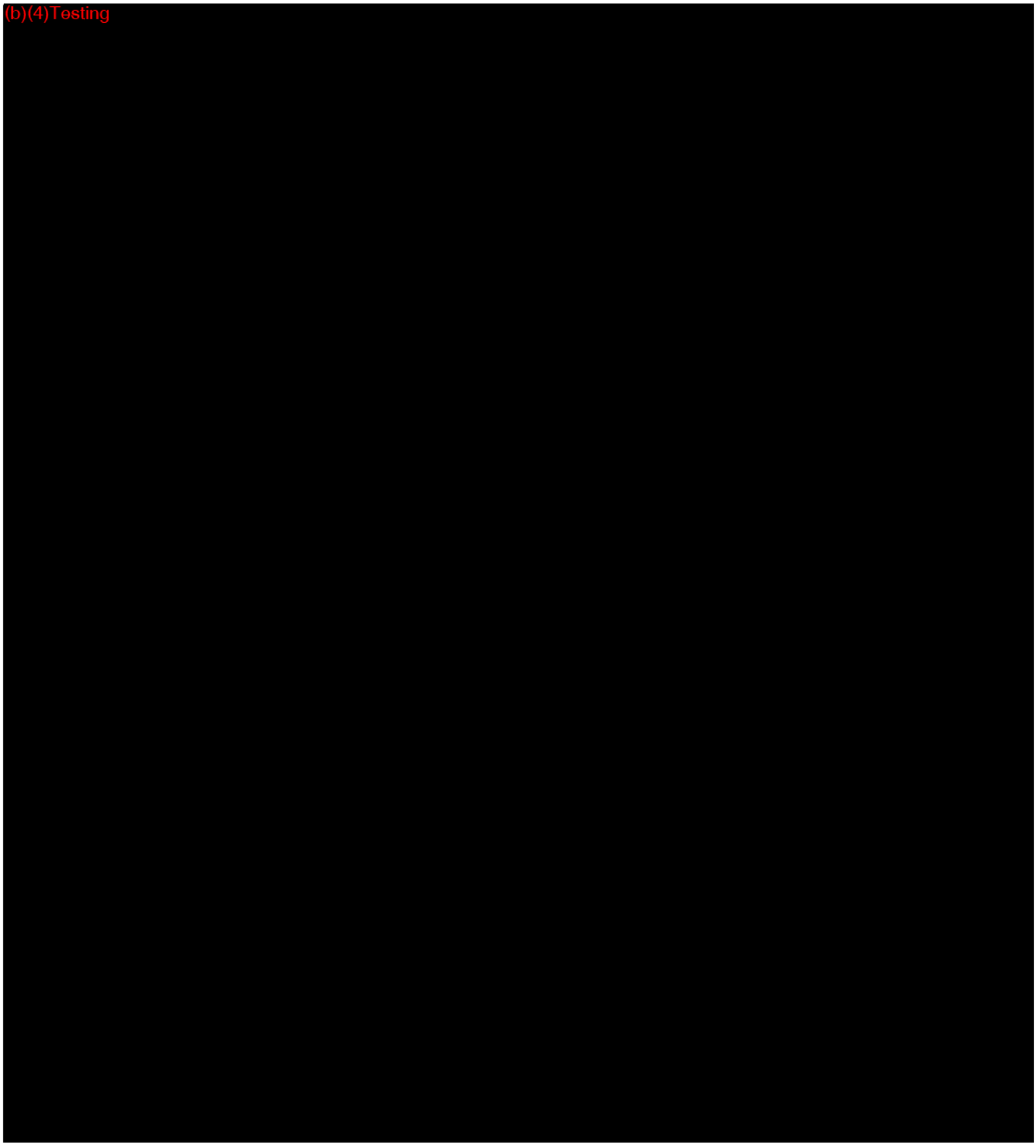


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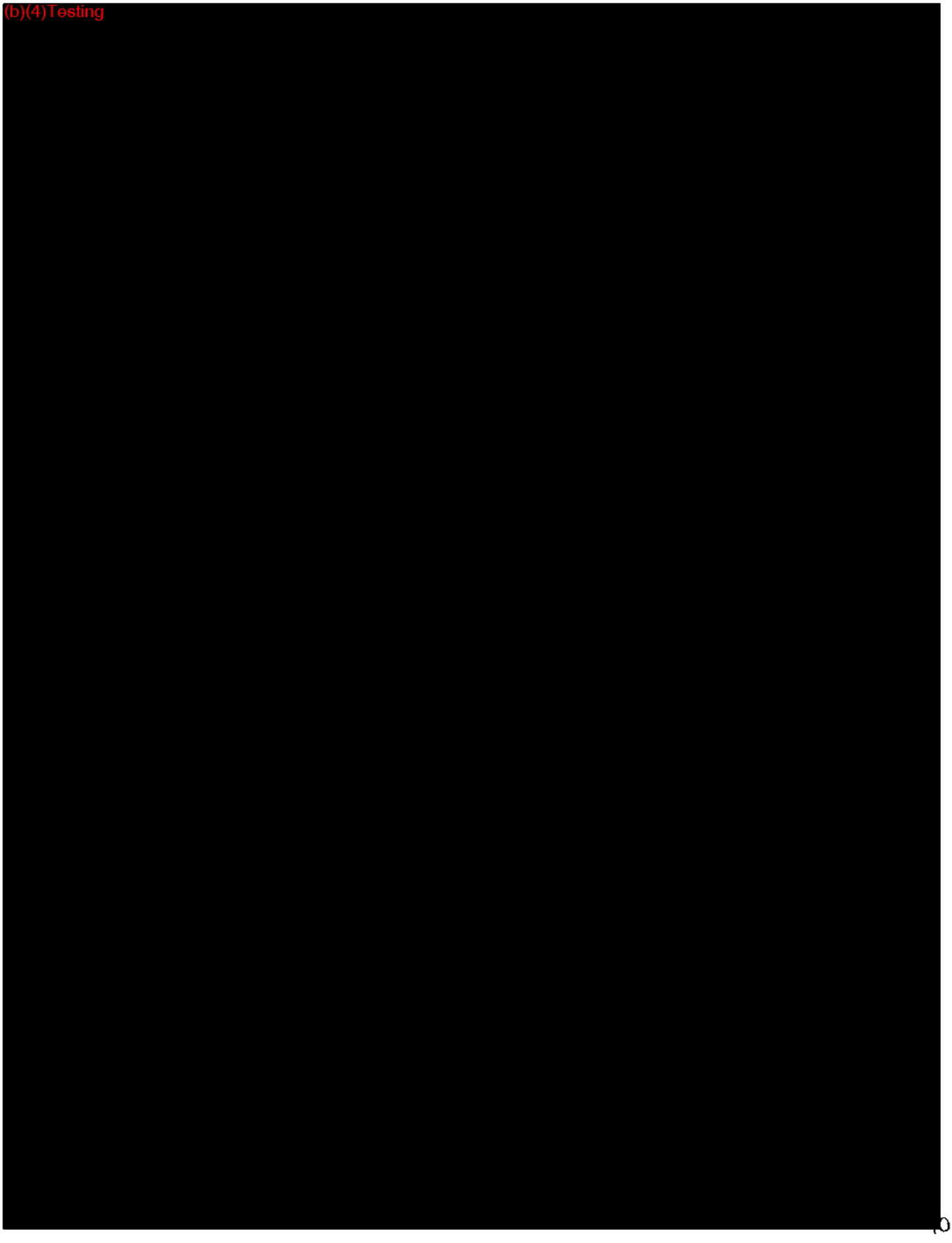

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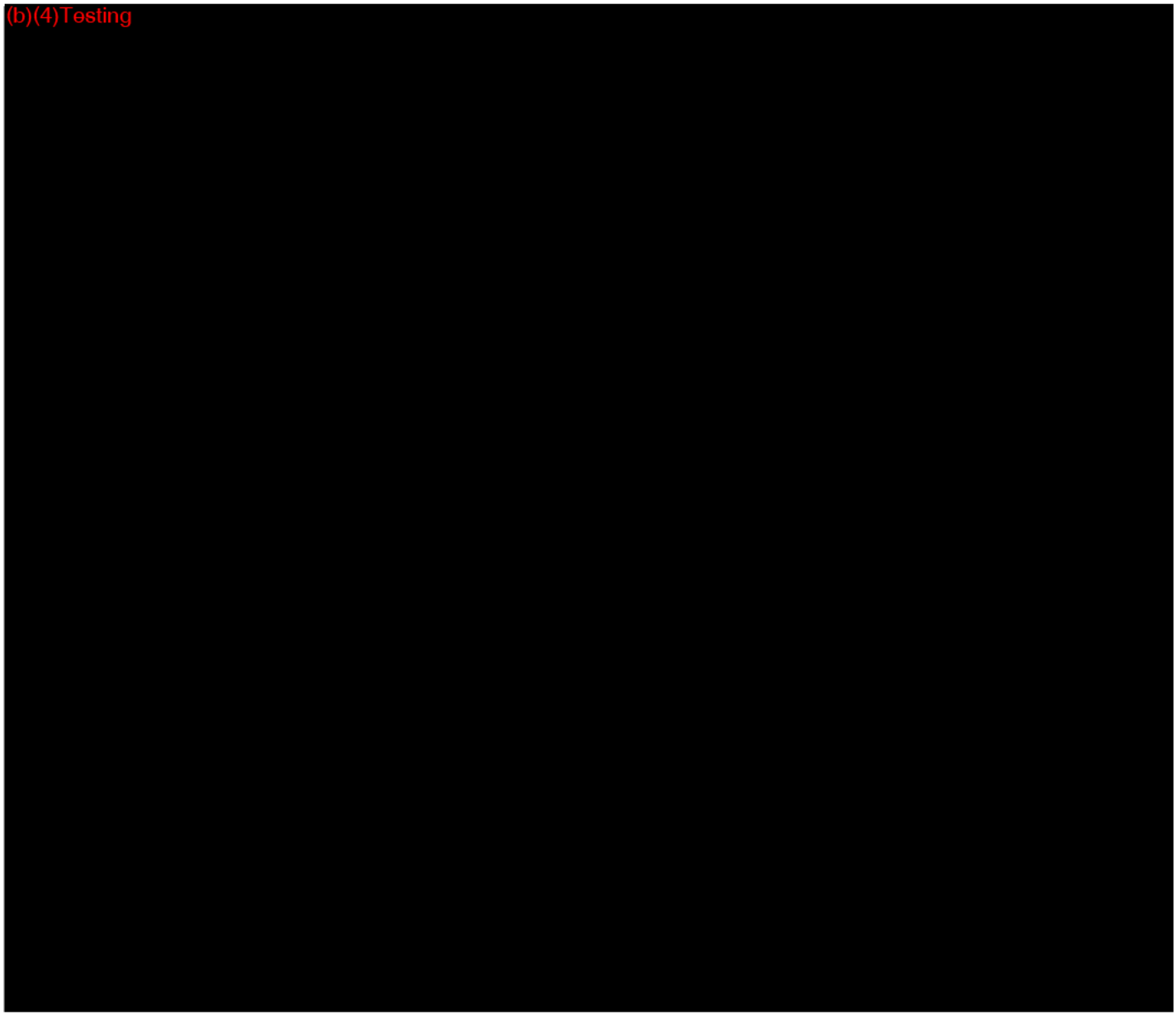

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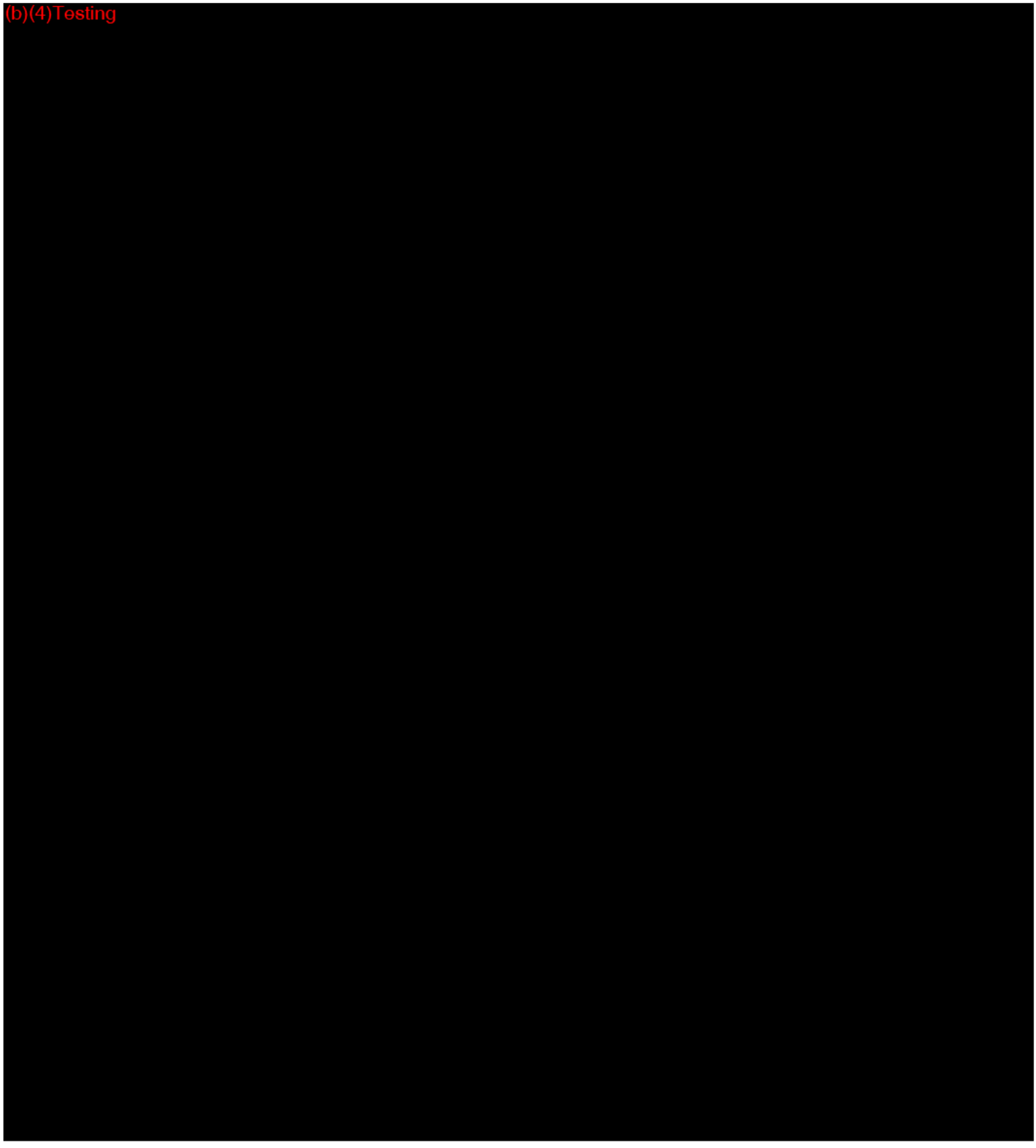
(b)(4)Testing

Nerve function recovery: sciatic nerve model

(b)(4)Testing



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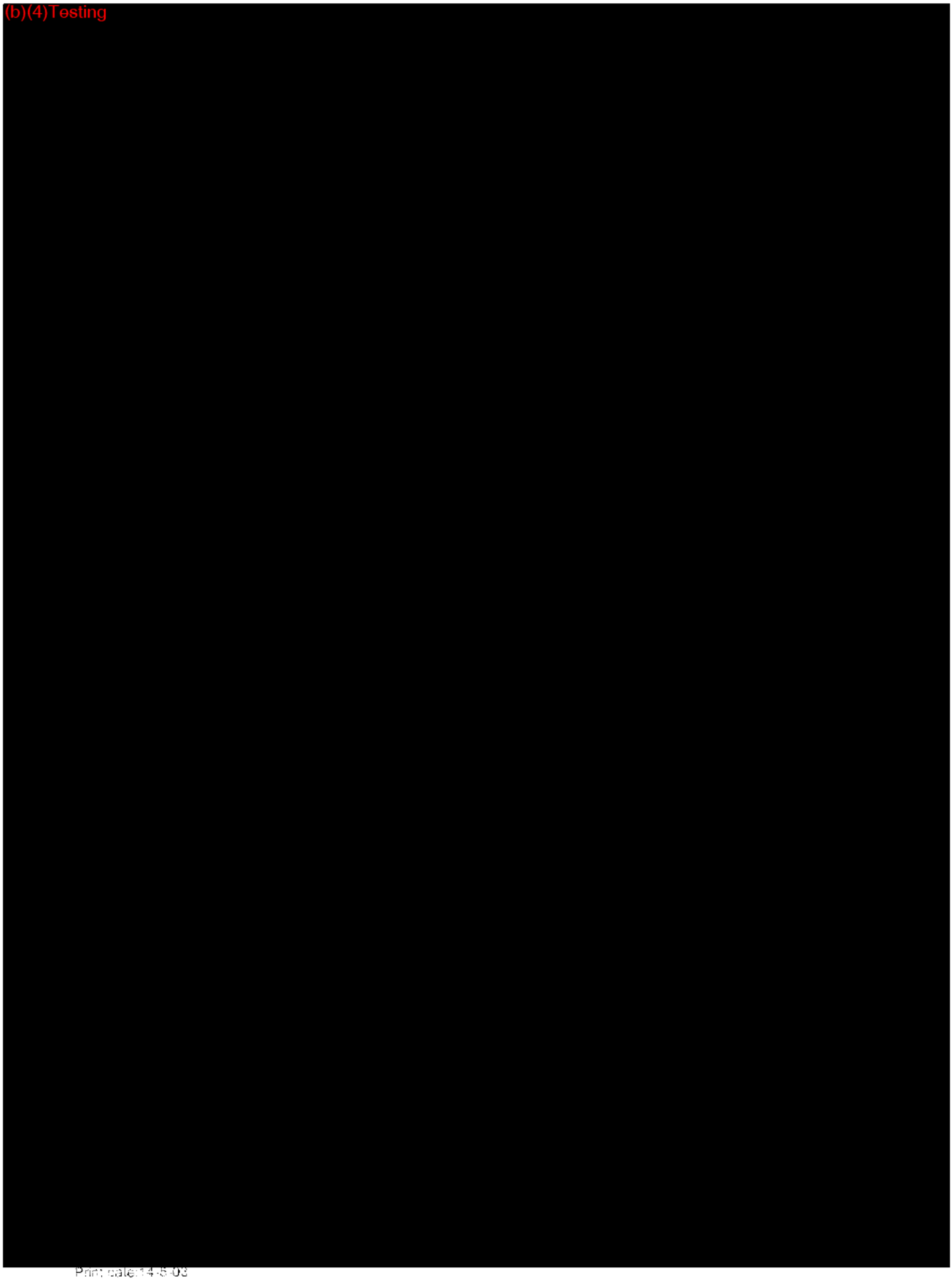

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Neurolac nerve guide versus autologous nerve graft

(b)(4)Testing

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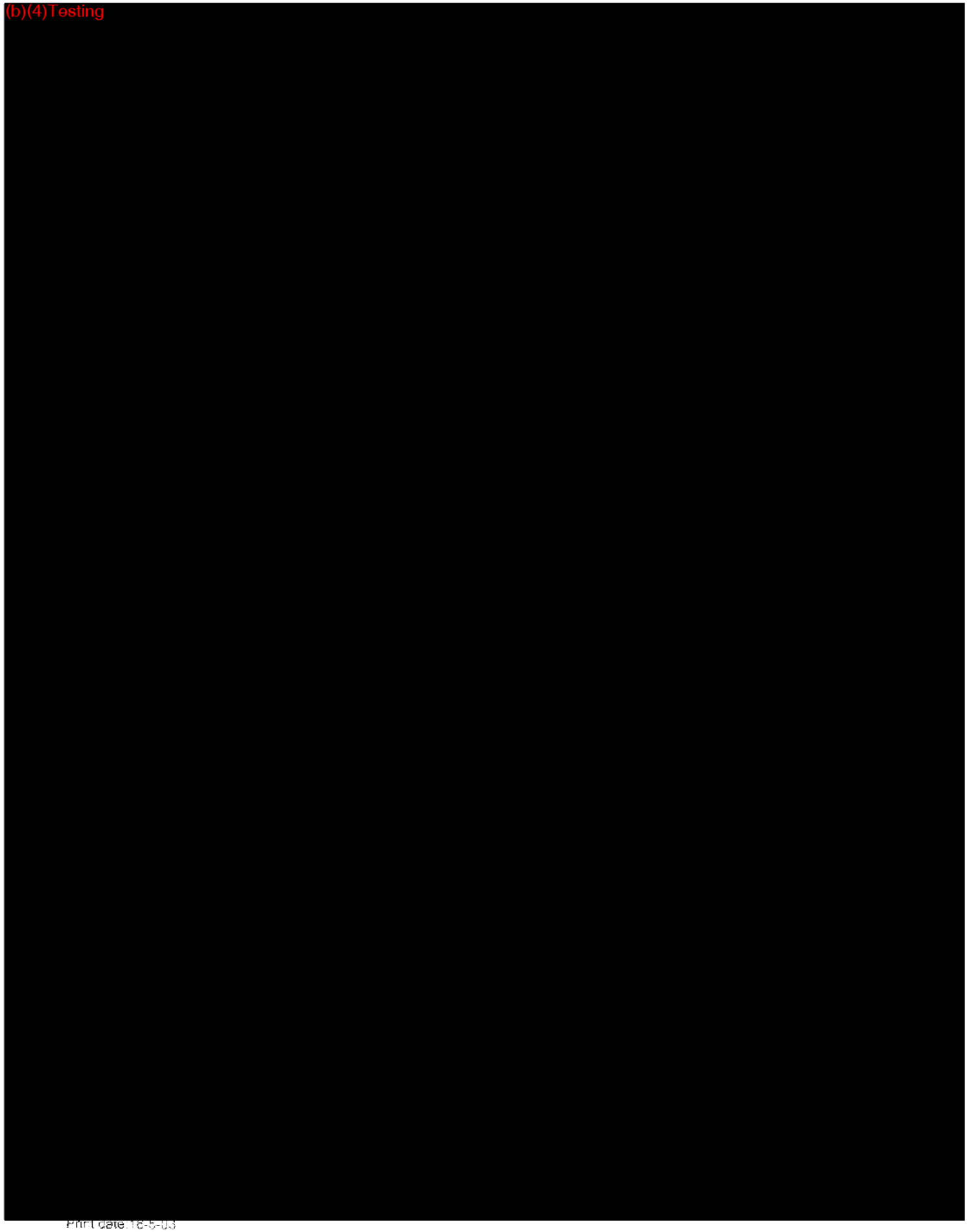

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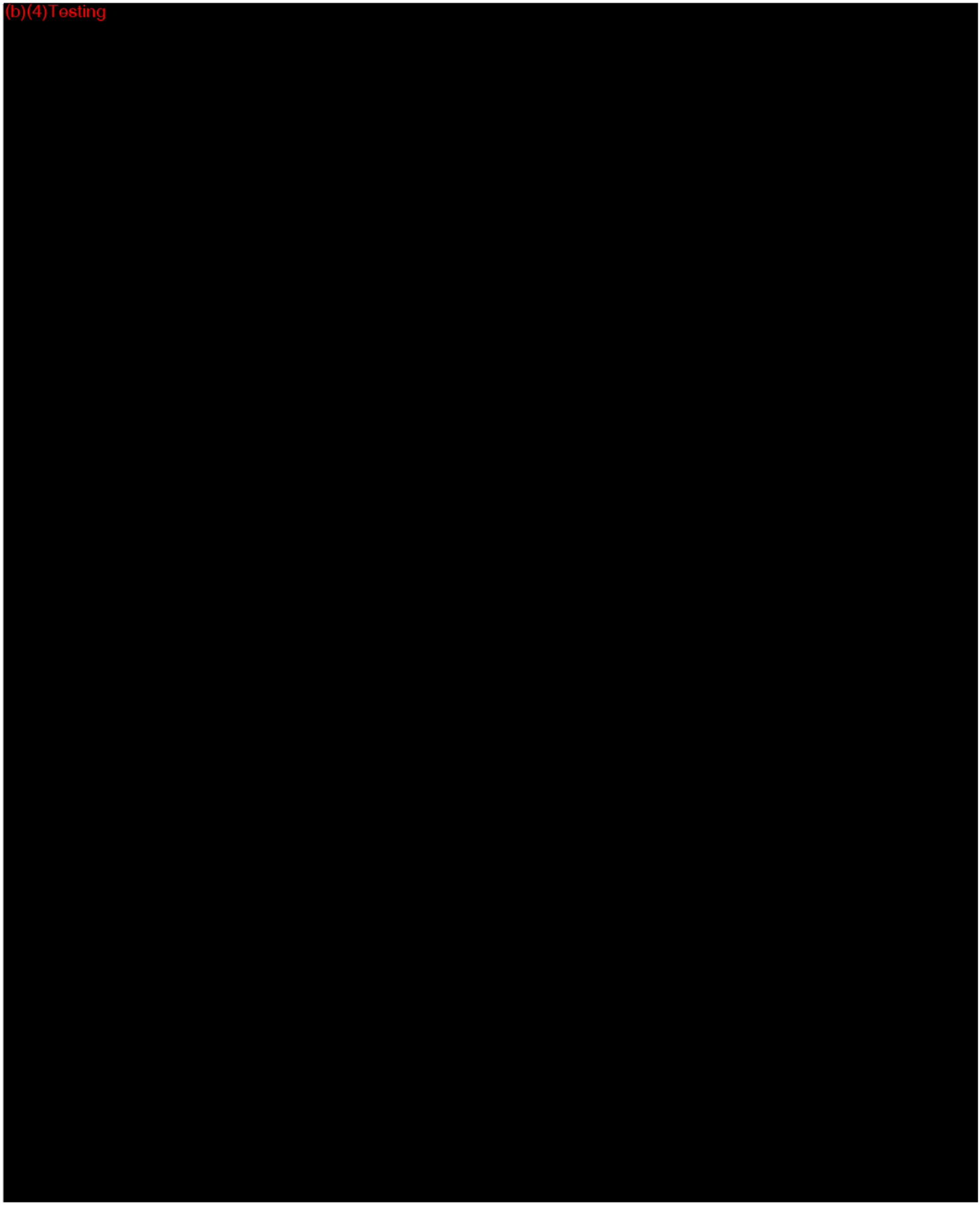

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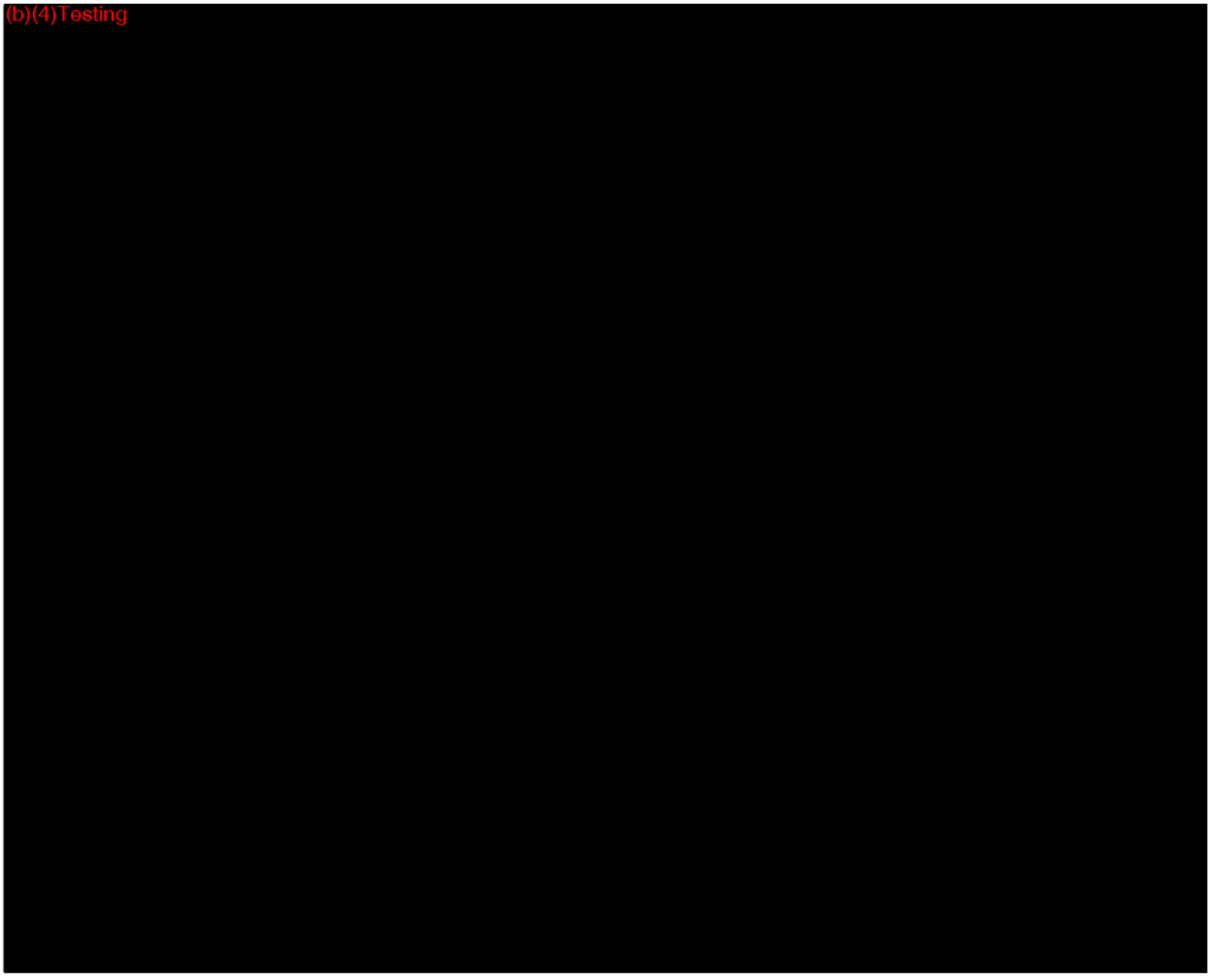
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Functional nerve recovery after bridging a 15 mm nerve gap with a Neurolac nerve guide

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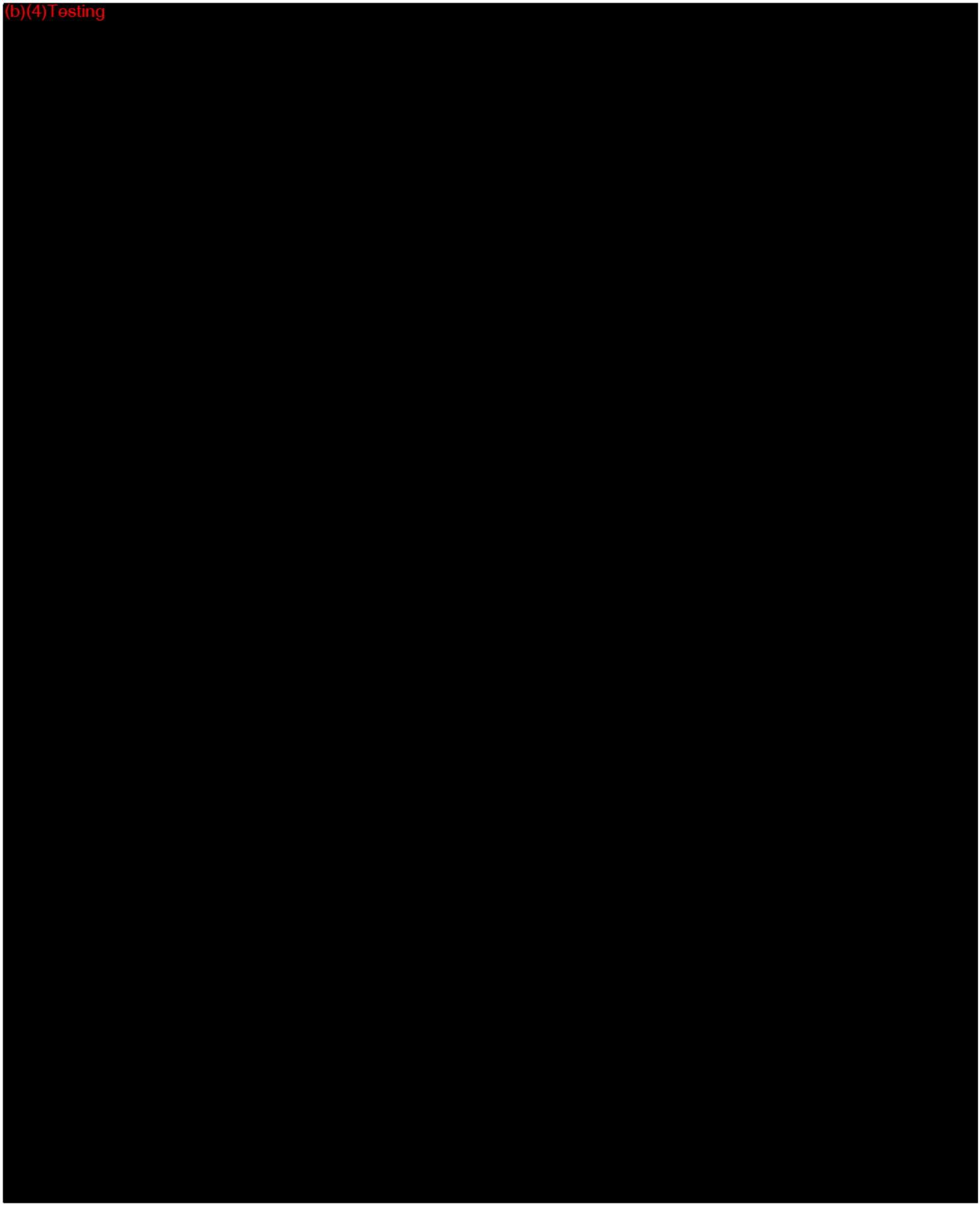

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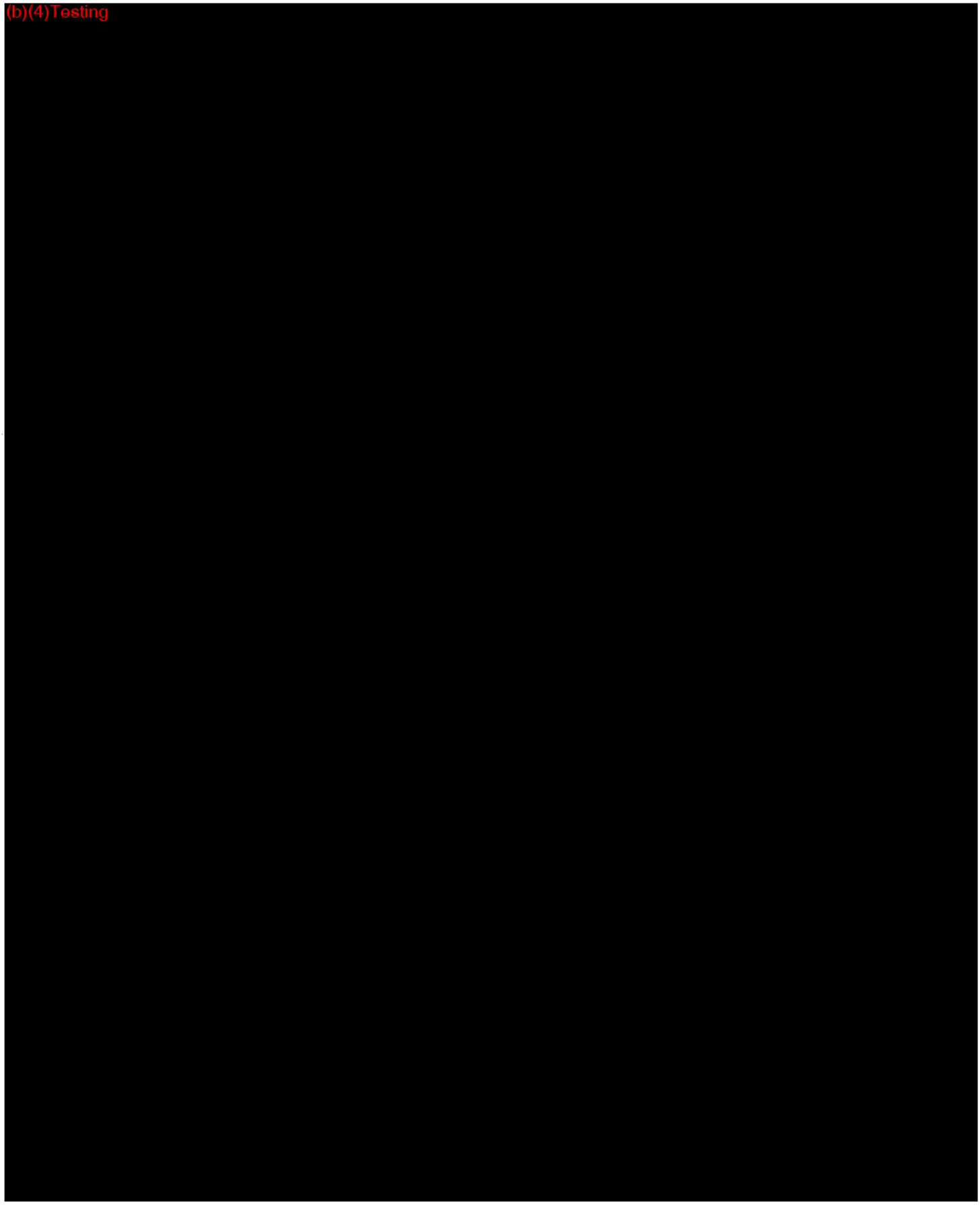

APPENDIX G: BIOCOMPATIBILITY DATA

Cytotoxicity
Irritation
Sensitization
Hemocompatibility
Acute systemic toxicity
Pyrogenicity
Mutagenicity /genotoxicity
Sub chronic toxicity
Carcinogenicity
Chronic toxicity
Reproductive toxicity
Implantation

Cytotoxicity

(b)(4)Testing

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Irritation

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Sensitization

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Hemocompatibility

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Acute systemic toxicity

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Pyrogenicity

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Mutagenicity /genotoxicity

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Sub chronic toxicity

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Carcinogenicity

Chronic toxicity

Reproductive toxicity

(b)(4)Testing

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Contents

Study summary

(b)(4)Testing

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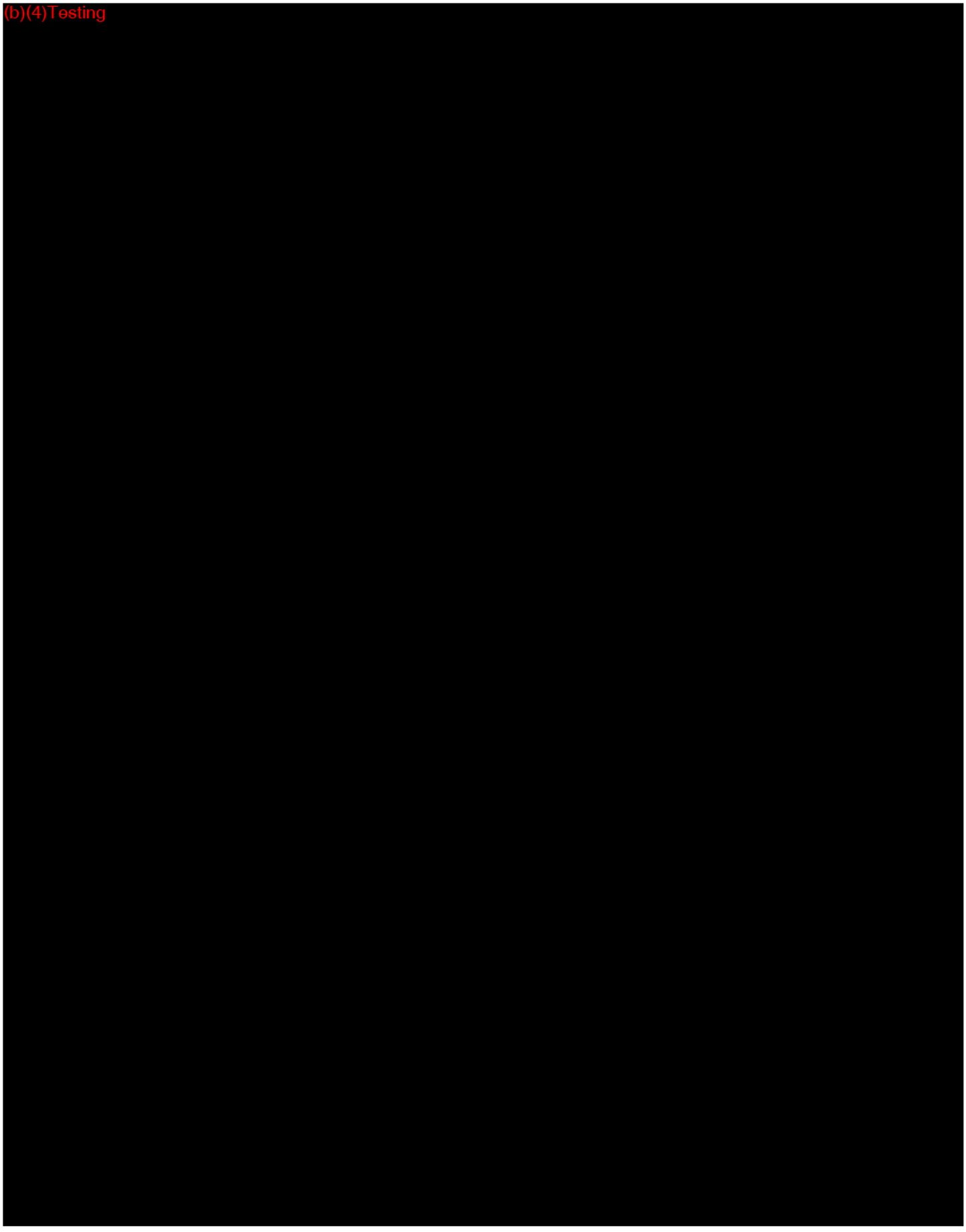
(b)(4)Testing



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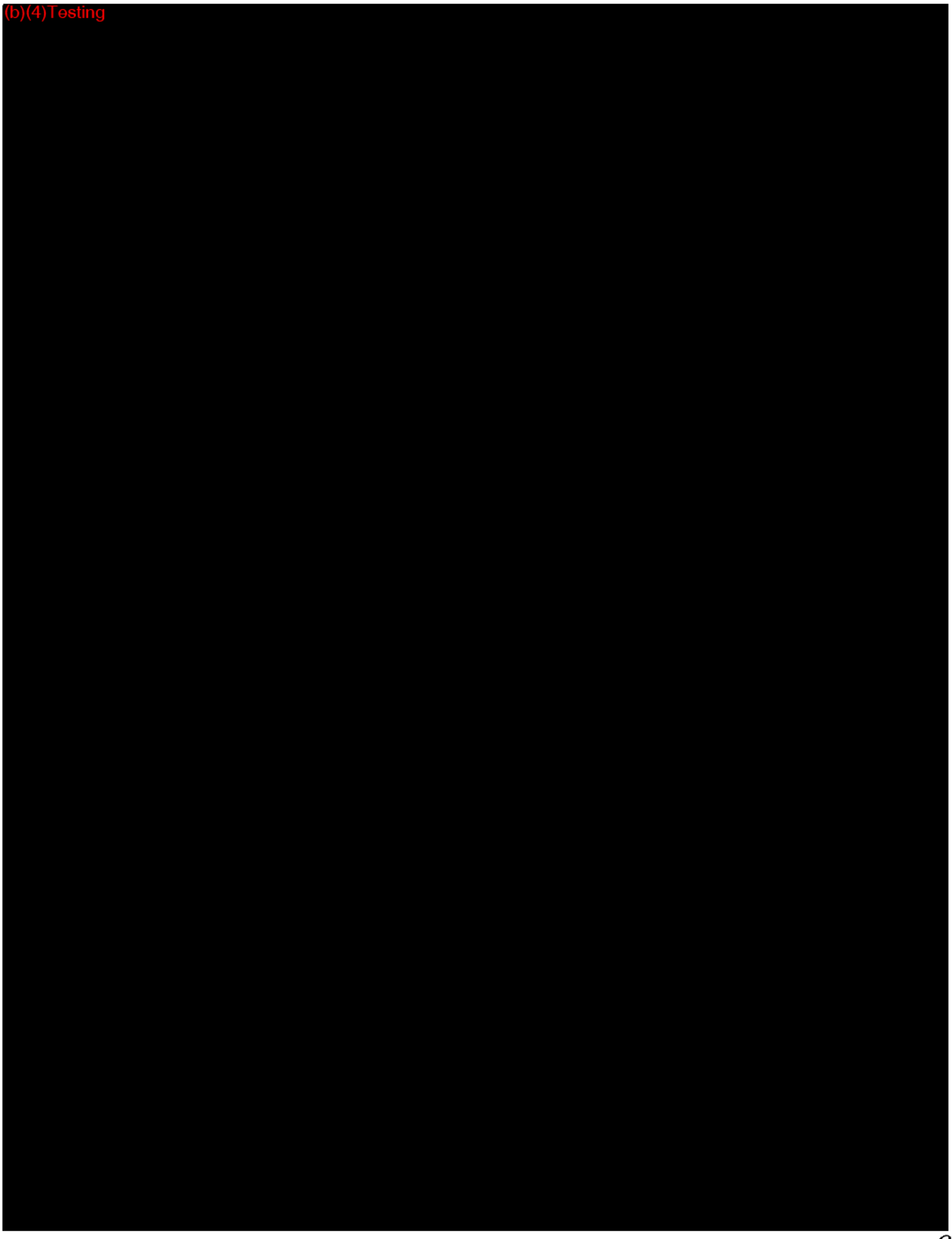

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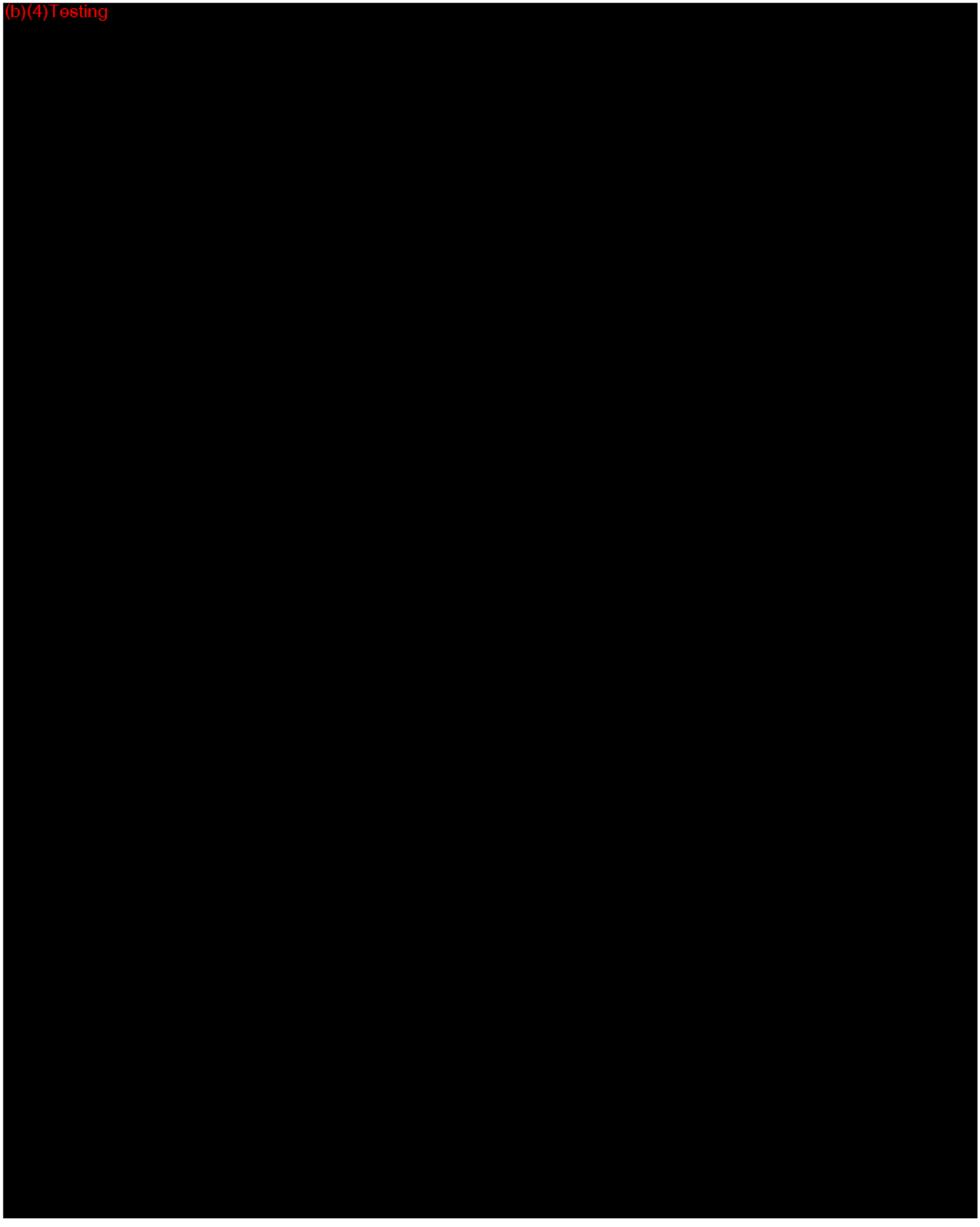

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Implantation

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Contents

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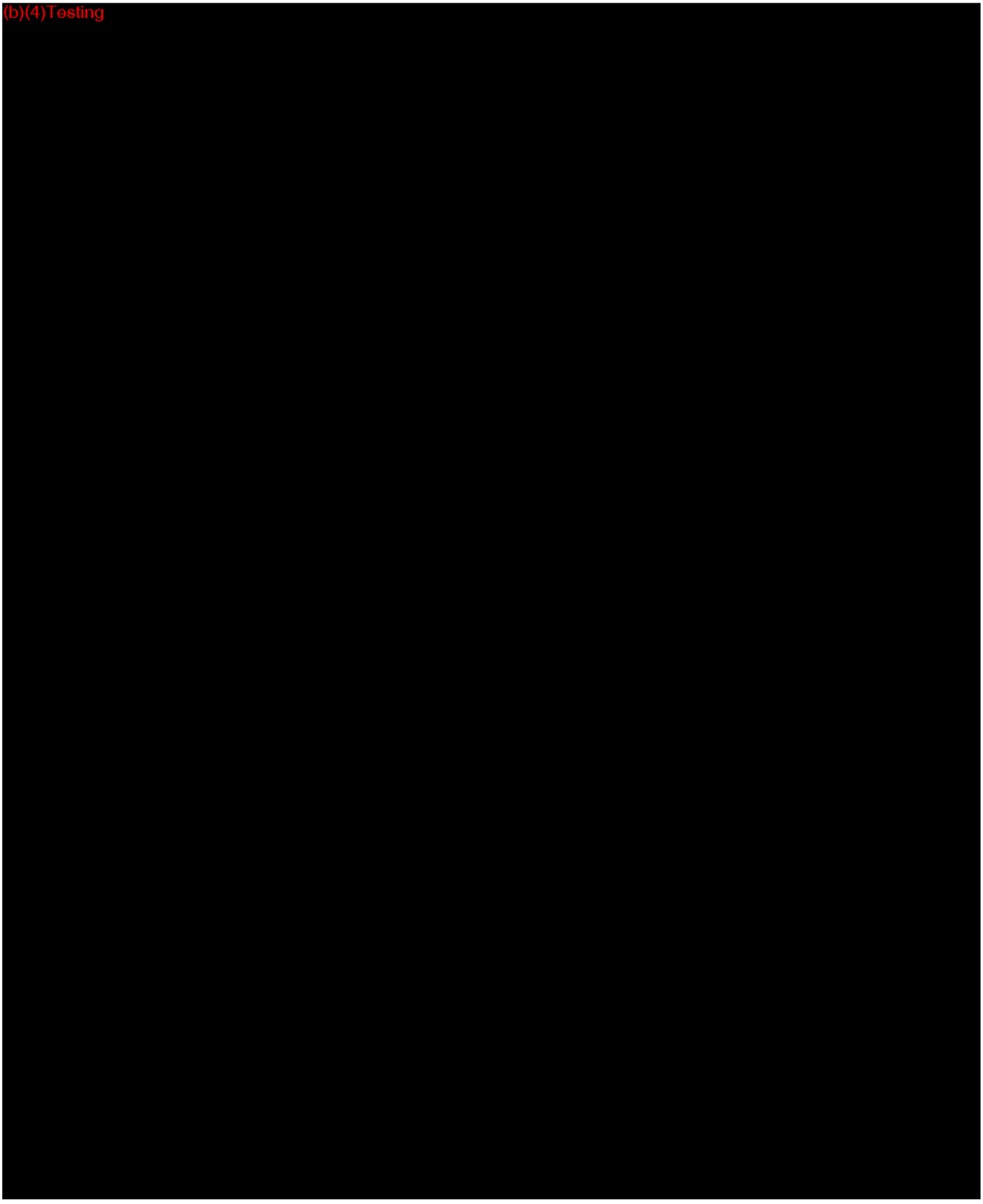

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Contents

Study summary

(b)(4) Testing

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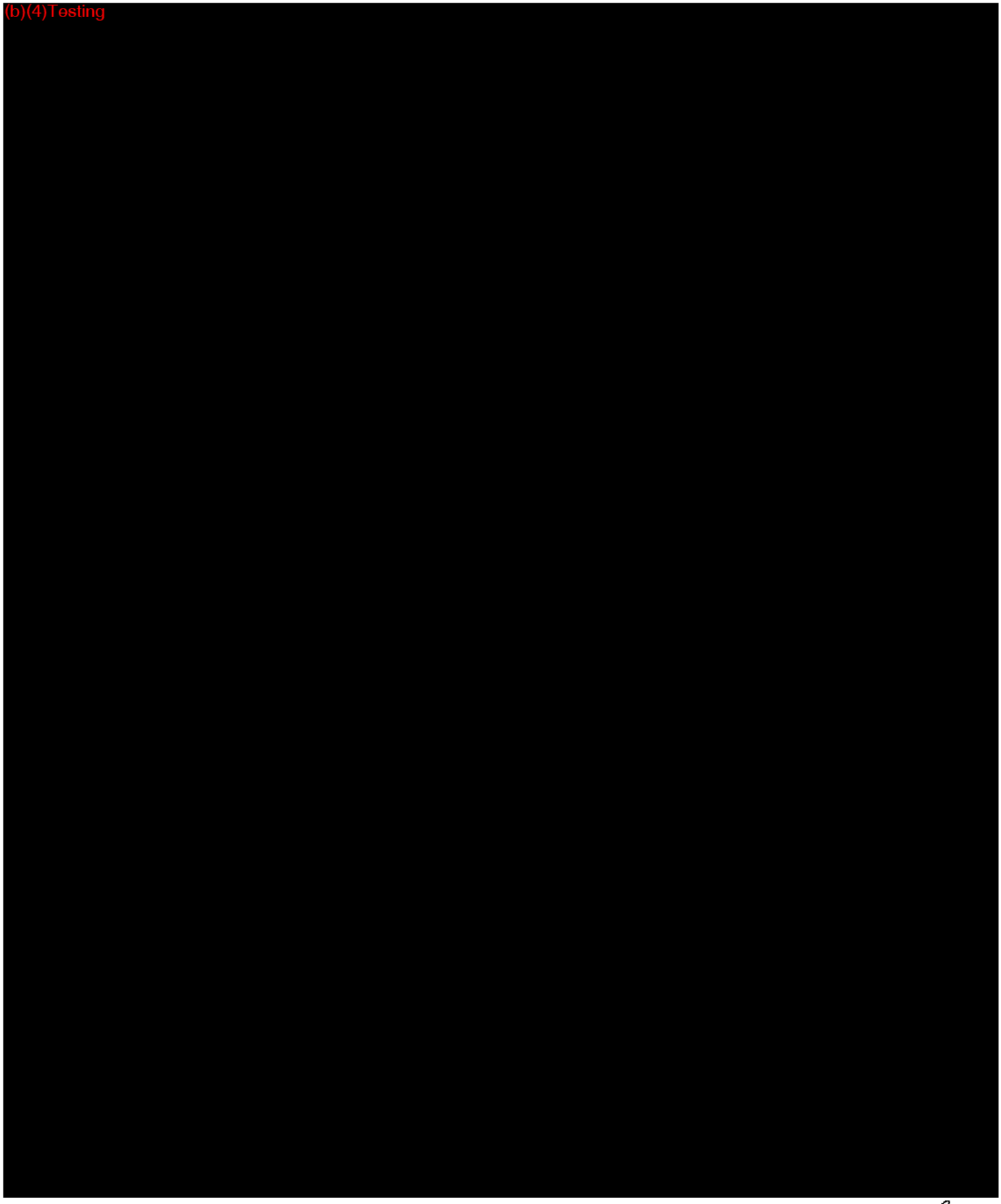

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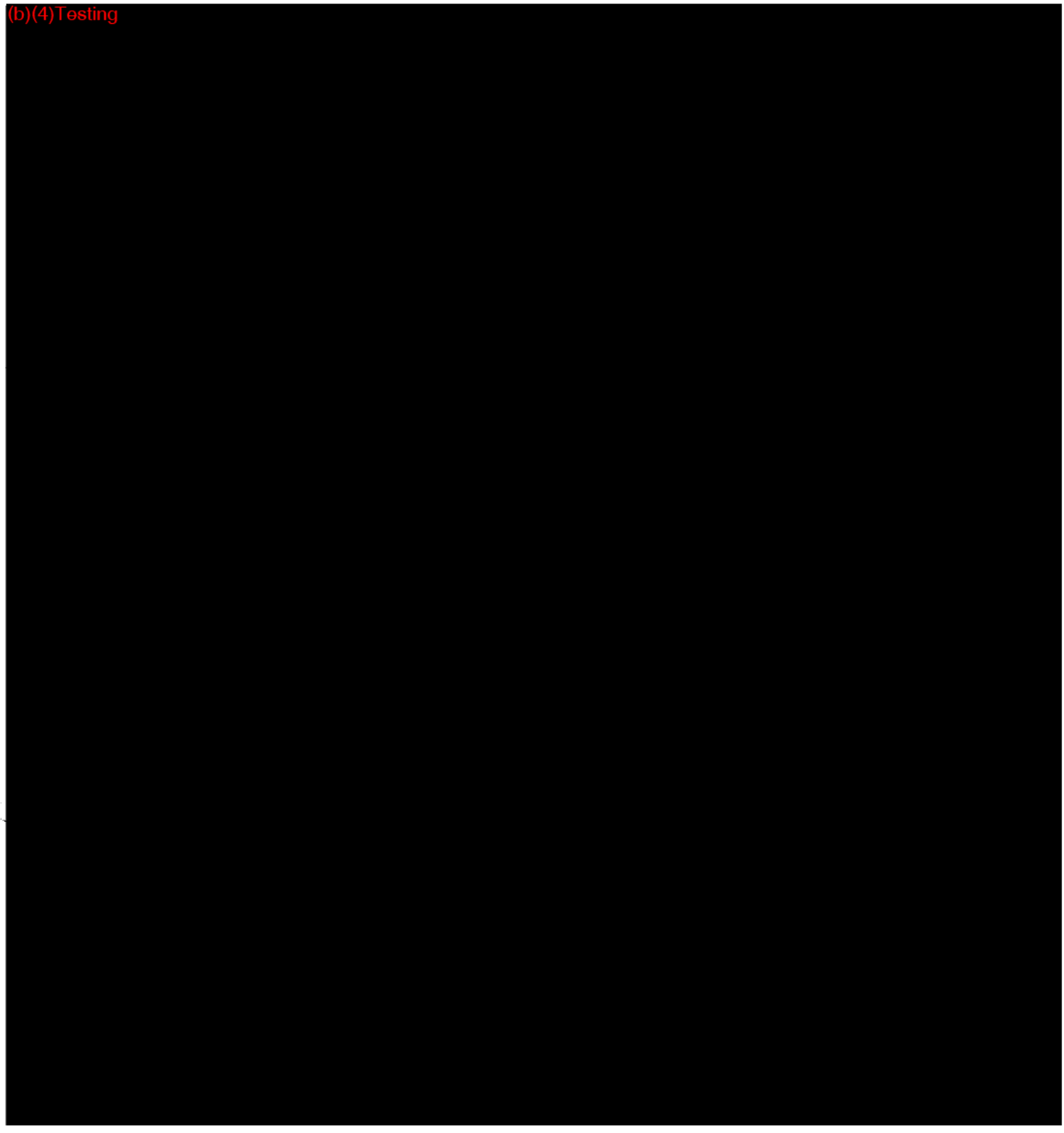

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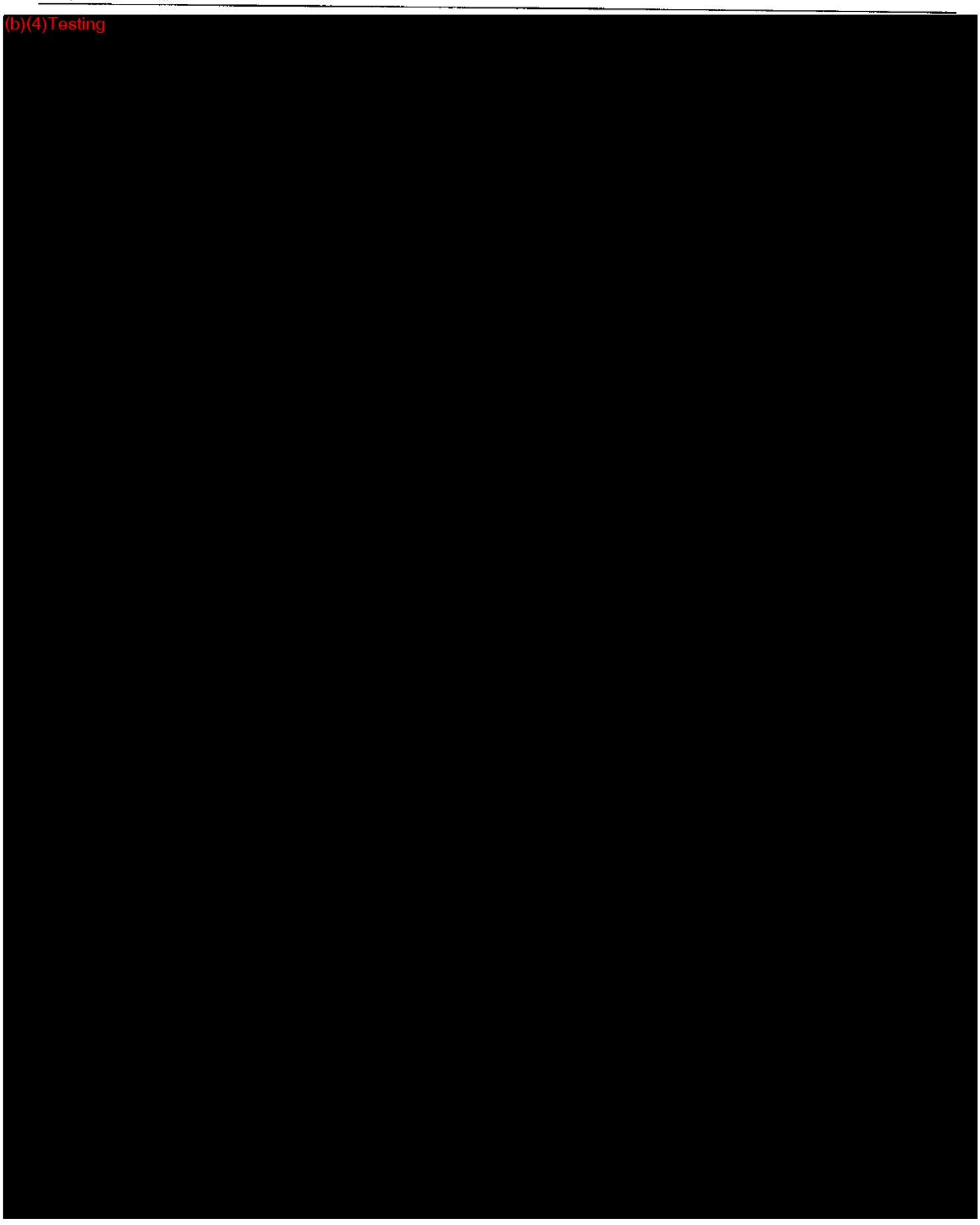

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Food and Drug Administration
Memorandum

From: Reviewer(s) - Name(s) David B. Berkowitz PhD

Subject: 510(k) Number K032113

To: The Record - It is my recommendation that the subject 510(k) Notification:

☐ Refused to accept.
☐ Requires additional information (other than refuse to accept).
☒ Is substantially equivalent to marketed devices.
☐ NOT substantially equivalent to marketed devices.
☐ Other (e.g., exempt by regulation, not a device, duplicate, etc.)

Is this device subject to Section 522 Postmarket Surveillance?	☐ YES	☒ NO
Is this device subject to the Tracking Regulation?	☐ YES	☒ NO
Was clinical data necessary to support the review of this 510(k)?	☐ YES	☒ NO
Is this a prescription device?	☒ YES	☐ NO
Was this 510(k) reviewed by a Third Party?	☐ YES	☒ NO
Special 510(k)?	☐ YES	☒ NO
Abbreviated 510(k)? Please fill out form on H Drive 510k/boilers	☐ YES	☒ NO

Truthful and Accurate Statement ☐ Requested ☒ Enclosed
☒ A 510(k) summary OR ☐ A 510(k) statement
☐ The required certification and summary for class III devices
☒ The indication for use form

Combination Product Category (Please see algorithm on H drive 510k/Boilers) N

Animal Tissue Source ☐ YES ☒ NO Material of Biological Origin ☐ YES ☒ N

The submitter requests under 21 CFR 807.95 (doesn't apply for SEs):
☐ No Confidentiality ☐ Confidentiality for 90 days ☐ Continued Confidentiality exceeding 90

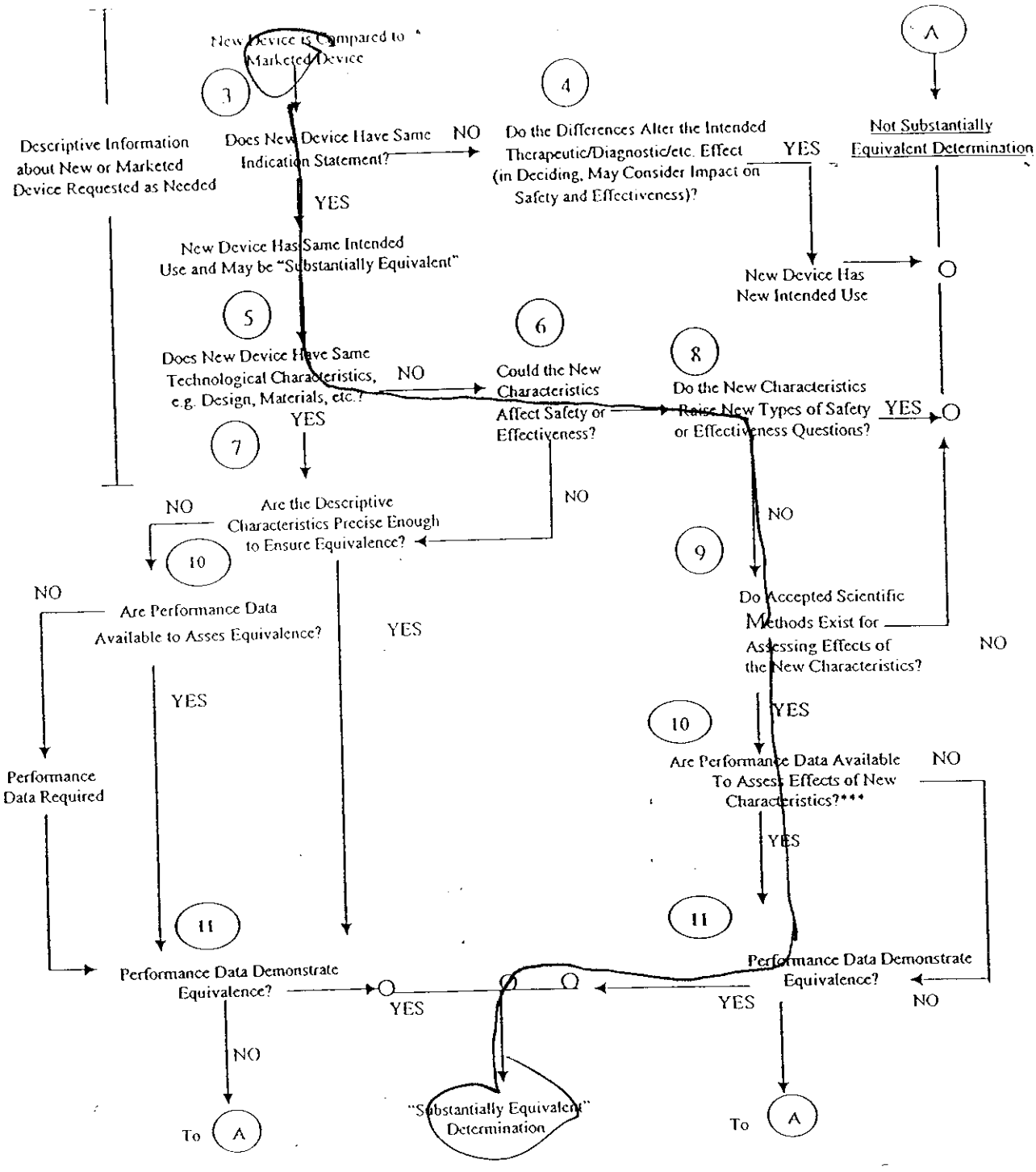
Predicate Product Code with class: Additional Product Code(s) with panel (optional):

JXI Nerve Cuff class II

Review: Stephen Chucha (Branch Chief) PRSB (Branch Code) 10/9/03 (Date)

Final Review: Miriam C. Provost for (Division Director) 10/10/03 (Date)

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.

510(K) MEMORANDUM

TO: K032115

FROM: David B. Berkowitz, Veterinarian
ODE/DGRND/Plastic and Reconstructive Surgery Devices Branch

DATE: October 7, 2003

SUBJ: Neurolac® Nerve Guide
Polyganics BV
Jan Bart Hak, Manager of clinical and Regulatory Affairs (See Aug. 4, letter)
31 50 588 6588

Recommendation: S.E.
Procode: JXI
Class: II
Regulation Number: 882.5275
Regulation Name: Nerve Cuff

REVIEW:

Device Description: This is a co-polyester of poly(DL-lactide-ε-caprolactone) tube used to guide regenerating axons and to exclude ingrowth of fibrous tissue during regeneration.

1. Comparison of the Intended Use/Indications of the Subject Device and Predicate(s)

Subject Device

For the reconstruction of a peripheral nerve discontinuity up to 20mm in patients who have sustained a complete division of a nerve.

Predicate devices

K983007 Neurotube Neuroregen LLC For single use in patients with a peripheral nerve injury where the nerve gap is more than or equal to 8 mm, but less than 3 cm. The tube is made of polyglycolic acid.

K011168 NeuroGen™ Nerve Guide – For the repair of peripheral nerve discontinuities where gap closure can be achieved by flexion of the extremity. The tube is made of bovine collagen.

Discussion of whether the intended use/indications are the same

The K011168 closure is limited to cases in which closure can be achieved by flexion. The current device is not restricted to flexion. I do not know the significance of this restriction. The current device can be used for up to a 20 mm gap, well within the range of the predicates.

2. **Comparison of the Technological Characteristics (Design, Materials, Sizes, Shapes, etc.) of the Subject Device and Predicate(s)**

Subject Device

The chemical composition is provided. This is a copolyester of poly(DL-lactide-ε-caprolactone) tube. The tube retains strength for 8 weeks, and then rapidly degrades. (b) (4) [redacted]

[redacted] (b) (4)

Predicate Devices

K983007 Neurotube™ Nerve Cuff – Made from polyglycolic acid. 2.3 mm diameter and 4 cm long. Full absorption in 6 months. The corrugated configuration said to prevent collapse of tube from soft tissue pressure.

K0111168 – Made from bovine collagen. 2 – 4 cm, with i.d. 2, 4, 5, 6, and 7 mm.

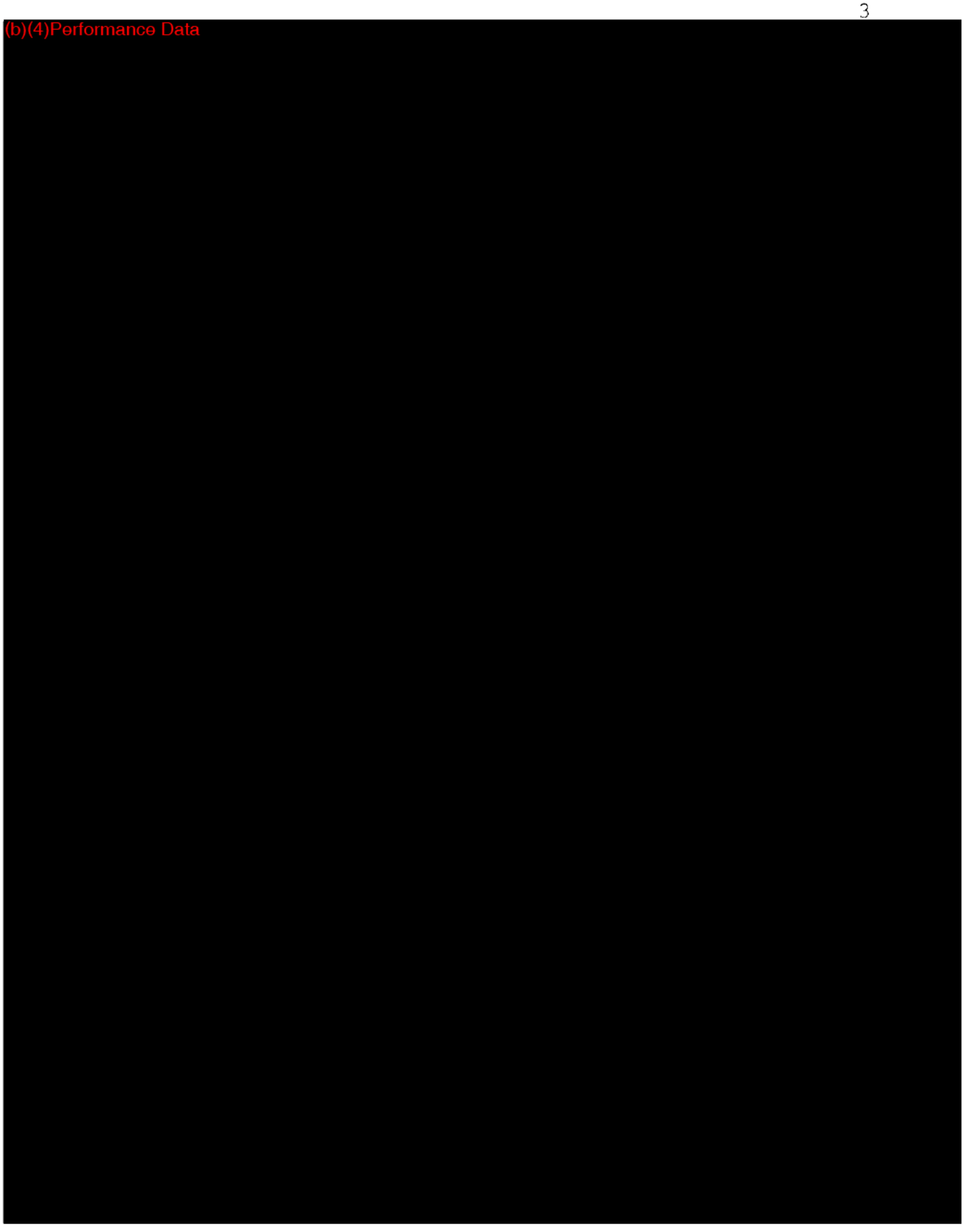
Discussion of whether the subject device has a significant change in technological characteristics.

The materials are different for each device. Other predicates include silicone and collagen tubes. Equivalence rests on the safety and effectiveness similarities.

3. **Comparative Data (in vitro, animal and/or clinical)**

Safety Data - Subject Device

(b) (4) [redacted]


(b)(4)Performance Data

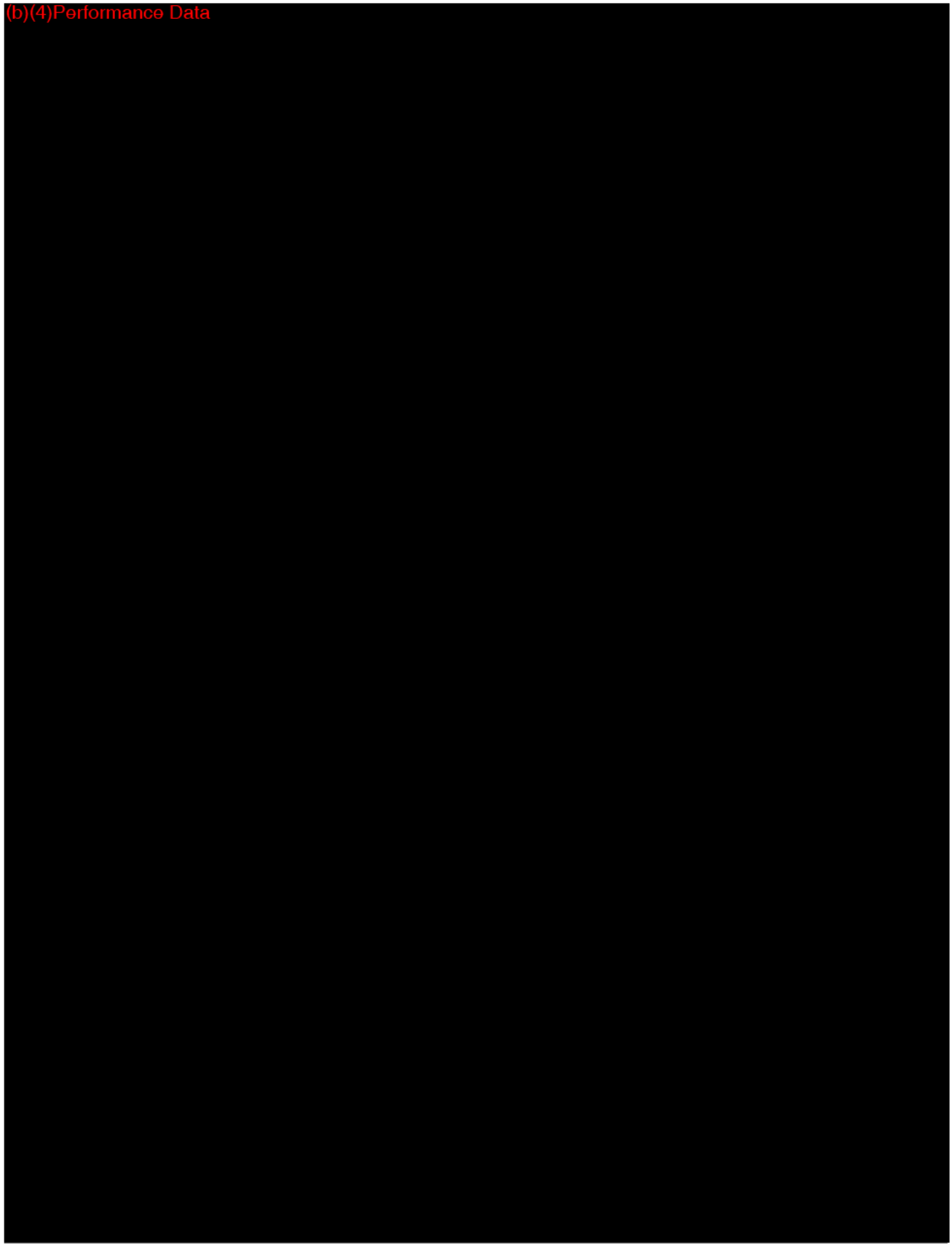
(b)(4)Performance Data

Safety Data - Predicate Devices

(b)(4)Performance Data

Effectiveness Data – Subject Device

(b)(4)Performance Data


(b)(4)Performance Data

(b)(4)Performance Data

[redacted]

Effectiveness Data - Predicate Devices

(b)(4)Performance Data

[redacted]

Discussion of whether the data demonstrate that the subject device is as safe and effective as the predicate(s)

(b)(4)Performance Data

[redacted]

4. **Does the product contain drugs or biologicals?**
   a. **If yes, what drug(s)/biologic(s):** No
   Combination Product Code: N

5. **Sterilization**

(b) (4)

[redacted]

6. **Is the Labeling Adequate?**
   (OTC and/or Prescription) Rx
   Package Insert (page) 17 and appendix C

(b) (4)

[redacted]

7. **Claims**

(b) (4)

[redacted]

8. **Has sponsor provided all administrative requirements?**
   - Truthful and Accurate Statement 10
   - 510(k) Summary or Statement 32
   - Indication for Use Page 8

9. **Analysis of the Equivalence of the Subject and Predicates**

(b) (4)

[redacted]

(b) (4)

[redacted]

10. Contact History/Requests for More Information:

(b) (4)

[redacted]

David B Behrents 10/8/03

Name Date

Plastic and Reconstructive Surgery Devices Branch

REVISED:3/14/95

THE 510(K) DOCUMENTATION FORMS ARE AVAILABLE ON THE LAN UNDER 510(K) BOILERPLATES TITLED "DOCUMENTATION" AND MUST BE FILLED OUT WITH EVERY FINAL DECISION (SE, NSE, NOT A DEVICE, ETC.).

"SUBSTANTIAL EQUIVALENCE" (SE) DECISION MAKING DOCUMENTATION

K032115

Reviewer: David Berkowitz

Division/Branch: DGRND/PRSR

Device Name: NeuroLac Nerve Guide

Product To Which Compared (510(K) Number If Known): _____

	YES	NO	
1. Is Product A Device	↘		If NO = Stop
2. Is Device Subject To 510(k)?	↘		If NO = Stop
3. Same Indication Statement?	↘		If YES = Go To 5
4. Do Differences Alter The Effect Or Raise New Issues of Safety Or Effectiveness?			If YES = Stop NE
5. Same Technological Characteristics?		↘	If YES = Go To 7
6. Could The New Characteristics Affect Safety Or Effectiveness?	↘		If YES = Go To 8
7. Descriptive Characteristics Precise Enough?			If NO = Go To 10 If YES = Stop SE
8. New Types Of Safety Or Effectiveness Questions?		↘	If YES = Stop NE
9. Accepted Scientific Methods Exist?	↘		If NO = Stop NE
10. Performance Data Available?	↘		If NO = Request Data
11. Data Demonstrate Equivalence?	↘		Final Decision:

Note: In addition to completing the form on the LAN, "yes" responses t questions 4, 6, 8, and 11, and every "no" response requires an explanation.

1. Intended Use: Reconstruction of a peripheral nerve discontinuity up to 20 mm in patients with a complete nerve division.

2. Device Description: Provide a statement of how the device is either similar to and/or different from other marketed devices, plus data (if necessary) to support the statement. Is the device life-supporting or life sustaining? Is the device implanted (short-term or long-term)? Does the device design use software? Is the device sterile? Is the device for single use? Is the device over-the-counter or prescription use? Does the device contain drug or biological product as a component? Is this device a kit? Provide a summary about the devices design, materials, physical properties and toxicology profile if important.

EXPLANATIONS TO "YES" AND "NO" ANSWERS TO QUESTIONS ON PAGE 1 AS NEEDED

1. Explain why not a device:

2. Explain why not subject to 510(k):

3. How does the new indication differ from the predicate device's indication:

4. Explain why there is or is not a new effect or safety or effectiveness issue: The material is new for this type of device.

5. Describe the new technological characteristics: The device is made from poly(DL-lactide-ε-caprolactone).

6. Explain how new characteristics could or could not affect safety or effectiveness: may interfere with neural anastomosis.

7. Explain how descriptive characteristics are not precise enough:

8. Explain new types of safety or effectiveness questions raised or why questions are not new:

9. Explain why existing scientific methods can not be used:

10. Explain what performance data is needed: Device assist the regrowing of nerves.

11. Explain how the performance data demonstrates that the device is or is not substantially equivalent: Performs as well as predicates.

ATTACH ADDITIONAL SUPPORTING INFORMATION

Internal Administrative Form

	YES	
1. Did the firm request expedited review?		X
2. Did we grant expedited review?		
3. Have you verified that the Document is labeled Class III for GMP purposes?		
4. If, not, has POS been notified?		
5. Is the product a device?	X	
6. Is the device exempt from 510(k) by regulation or policy?	X	
7. Is the device subject to review by CDRH?	X	
8. Are you aware that this device has been the subject of a previous NSE decision?		X
9. If yes, does this new 510(k) address the NSE issue(s), (e.g., performance data)?		
10. Are you aware of the submitter being the subject of an integrity investigation?		X
11. If, yes, consult the ODE Integrity Officer.		
12. Has the ODE Integrity Officer given permission to proceed with the review? (Blue Book Memo #I91-2 and Federal Register 90N0332, September 10, 1991.		

Berkowitz, David

From: Hak [hak@polyganics.com]
Sent: Wednesday, October 08, 2003 4:22 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

(b) (4)

[redacted]

Kind regards,

Jan-Bart Hak

----- Original Message -----
From: Berkowitz, David
To: 'Hak'
Sent: Tuesday, October 07, 2003 2:44 PM
Subject: RE: 510(k) application

(b) (4)

[redacted]

-----Original Message-----
From: Hak [mailto:hak@polyganics.com]
Sent: Friday, October 03, 2003 9:55 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

(b) (4)

[redacted]

21

(b) (4)

[redacted]

Kind regards,

Jan-Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
tel:+31 50 588 6586
gsm: +31 653 211 303

----- Original Message -----
From: Berkowitz, David
To: 'Hak'
Sent: Thursday, October 02, 2003 1:10 PM
Subject: RE: 510(k) application

(b) (4)

[redacted]

-----Original Message-----
From: Hak [mailto:hak@polyganics.com]
Sent: Thursday, October 02, 2003 2:46 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

I think e-mail is a perfect to address any issue quickly. I looking forward to your questions.

Kind regards,

Jan-Bart Hak, Ph.D.

Manager Clinical and Regulatory Affairs
Polyganics BV
tel:+31 50 588 6586
Mobile: +31 653 211 303

(b) (4)

[redacted]

----- Original Message -----
From: Berkowitz, David
To: 'hak@polyganics.com'
Sent: Wednesday, October 01, 2003 7:22 PM
Subject: 510(k) application

(b) (4)

[redacted]

93

Berkowitz, David

From: Hak [hak@polyganics.com]
Sent: Wednesday, October 08, 2003 7:48 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

(b) (4) [redacted]

Kind regards,

Jan-Bart Hak

----- Original Message -----
From: Berkowitz, David
To: 'Hak'
Sent: Tuesday, October 07, 2003 2:44 PM
Subject: RE: 510(k) application

(b) (4) [redacted]

-----Original Message-----
From: Hak [mailto:hak@polyganics.com]
Sent: Friday, October 03, 2003 9:55 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

(b) (4) [redacted]

94

(b) (4)

[redacted]

Kind regards,

Jan-Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
tel:+31 50 588 6586
gsm: +31 653 211 303

----- Original Message -----
From: Berkowitz, David
To: 'Hak'
Sent: Thursday, October 02, 2003 1:10 PM
Subject: RE: 510(k) application

(b) (4)

[redacted]

-----Original Message-----
From: Hak [mailto:hak@polyganics.com]
Sent: Thursday, October 02, 2003 2:46 AM
To: Berkowitz, David
Subject: Re: 510(k) application

Dear Mr. Berkowitz,

I think e-mail is a perfect to address any issue quickly. I looking forward to your questions.

Kind regards,

95

Jan-Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Polyganics BV
tel:+31 50 588 6586
Mobile: +31 653 211 303

----- Original Message -----
From: Berkowitz, David
To: 'hak@polyganics.com'
Sent: Wednesday, October 01, 2003 7:22 PM
Subject: 510(k) application

(b) (4) [redacted]

Indications for Use Form

510(k) Number: _____

Device Name: **Neurolac® Nerve Guide**

Indications for Use:

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

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

(Optional Format 1-2-96)

_____
(Division Sign-Off)

510(k) Number _____

510(k)
Summary of Safety and Effectiveness

Submitter:

Polyganics BV
L.J. Zielstraweg 1
9713 GX, Groningen
The Netherlands
www.polyganics.com

Contact Person:

Jan Bart Hak, Ph.D.
Manager Clinical and Regulatory Affairs
Tel : +31 50 588 6588
Fax : +31 50 588 6599
Mobile : +31 653 211 303
E-mail : hak@polyganics.com

Date Prepared:

May 20, 2003

General Provisions:

Trade Name: Neurolac® Nerve guide

Common Name: Nerve guide

Classification Name: Nerve Cuff, 21 CFR 882.5275

Device Classification: Class II

Predicate Devices:

• Neurotube™	Neuroregen L.L.C.	K983007
• NeuroGen™	Integra Life Sciences Corp.	K011168

Performance Standards

For the Nerve Cuff performance, the FDA, under section 514 of the Food, Drug and Cosmetic Act, has not established standards.

Indications for Use

The Neurolac® nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Device Description

Neurolac® is designed to be a flexible and transparent resorbable poly(DL-lactide-co-ε-caprolactone) tube to provide a protective environment for peripheral nerve regeneration after injury and to create a conduit to guide axonal growth across a nerve gap.

Neurolac® nerve guides are provided sterile in Tyvek pouch packages and retainer in a variety of sizes.

Performance Data:

The safety and effectiveness of the Neurolac nerve guides have been demonstrated via data collected from design verification tests and analyses. The design verification testing consisted of the following:

- In vitro suture retention testing
- In vitro degradation testing
- In vivo nerve function recovery

Summary of Substantial Equivalence

The design, fundamental technology and intended use (safety and efficacy) featured with the Neurolac® Nerve Guide are substantially equivalent to those featured with the competitor devices Neurotube™ (ref. 510(k) 983007; Neuroregen L.L.C.) and the NeuroGen™ Nerve Guide (ref. 510(k) 011168; Integra Life Sciences Corporation).

Biocompatibility, mechanical and physical property testing, in vitro degradation testing, and performance testing in an animal model provide reasonable scientific evidence that Neurolac® nerve guide is substantially equivalent to the predicate devices. Evaluation of the Polyganics Neurolac® Nerve guide based on biocompatibility testing, animal tests, results from literature and the comparison of the Neurolac® nerve guide with its predicate devices, shows that the Neurolac® nerve guide is safe for implantation.

Section 3: PROPOSED LABELING

Subject Device Labeling

The following proposed labeling for the subject device Neurolac Nerve Guide is provided in APPENDIX C:

- Outer label (Carton)
- Inner label (Pouch)
- Pre-printed carton text and graphics
- Instructions for Use

Intended Use of the Subject Device

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Promotional Materials

At present, no promotional materials are available for the subject device.

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Instructions for Use, English

STERILE. Sterilized with ethylene oxide gas. For single use only. Do not autoclave.
CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician.

Neurolac® peripheral nerve guide

Description

The Neurolac nerve guide is composed of the bioresorbable copolyester poly(DL-lactide-ε-caprolactone). The Neurolac nerve guide provides guidance and protection to regenerating axons.
The Neurolac nerve guide elicits a minimal acute inflammatory reaction of the surrounding tissue, which is followed by gradual encapsulation of the tube by fibrous tissue. Degradation of the Neurolac nerve guide occurs through hydrolysis leading to gradual reduction of molecular weight. The Neurolac nerve guide retains its initial mechanical properties up to 8 weeks, whereafter rapid loss of mechanical strength and gradual mass loss occur. The final degradation products, lactic acid and ω-hydroxy hexanoic acid, are resorbed, metabolized and excreted by the body. Animal studies demonstrated that a Neurolac nerve guide is resorbed within 16 months.

The Neurolac nerve guide inner diameter is indicated on the label, and is packed in a tray placed in a Tyvek pouch. The Neurolac nerve guide is indicated for single-use.

Indications

The Neurolac nerve guide is indicated for the reconstruction of a peripheral nerve discontinuity up to 20 mm in patients who have sustained a complete division of a nerve.

Contraindications

There are no known contraindications.

Warnings

- The Neurolac nerve guide is for single use only. Do not resterilize or re-use. Structural integrity and/or function may be impaired through cleaning, resterilization, or re-use and may cause adverse patient reactions. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from re-use of (or any part of) the Neurolac nerve guide;
- Sterile unless package has been opened or damaged. Discard open unused nerve guides;
- The Neurolac nerve guide should only be used by physicians who are trained in nerve defect repair techniques. Accordingly, Polyganics BV will not be responsible for any direct or consequential damages or expenses resulting from use by untrained personnel. The physician should consult recent literature on current medical practice on peripheral nerve repair;
- Nerve regeneration may be suboptimal in elderly, malnourished or debilated patients or in patients suffering from cancer, anaemia, obesity, diabetes, infection or other conditions which may delay wound healing, infected wounds, or moderate tissue inflammatory response characteristic of foreign body response.

Precautions

- Use prior to "Use by date";
- Store in dark, dry place at or below 4°C (39°F);
- Do not expose the nerve guide to organic solvents (e.g. chloroform, acetone);
- Do not use absorbable sutures for fixation of the nerve stumps into the nerve guide;
- Avoid crushing, crimping, kinking or other damage due to application of surgical instruments such as forceps, needle-holders and scissors or during handling of the device;
- Avoid tension on the nerve ends;
- Prevent compression and/or kinking of the Neurolac after the procedure. The use of a protective splint is recommended.

Adverse effects

Adverse events associated with the use of a Neurolac nerve guide may include but are not limited to:

- Failure to provide adequate nerve regeneration at sites where too much tension or compression occurs;
- Failure to provide adequate/complete nerve regeneration;
- Transitory local irritation;
- Infection;
- Allergy;
- Delayed wound healing.

Opening of the package

The pouch is opened in such a way that the tray remains sterile. The tray can be opened by sliding the lid. By clasping the nerve guide at one of its ends between a pair of tweezers, it can be taken from the tray. The lid contains a ruler that may be used as a reference to estimate the gap length or nerve stump diameter.

Surgical Procedure

1. Surgically expose the injured nerve.
2. Resect the injured segment distally and proximally until a nerve stump is identified with no residual intrafascicular scarring.

NOTE: Do not crush the nerve stumps as this can cause extrusion of intra-fascicular components.

3. Measure the length of the defect with all joints in an extended position.
4. If the gap length is between 0 and 20 mm, the injured nerve can be reconstructed with a Neurolac nerve guide.
5. Select the Neurolac nerve guide with the proper internal diameter.

NOTE: It is essential that the internal nerve guide diameter is slightly larger than the diameter of the transected nerve to guarantee optimal nerve regeneration.

6. Cut the selected nerve guide with a pair of scissors or a knife so that the nerve guide is 1 cm longer than the nerve gap.

Under some circumstances immobilization of the nerve ends, as to avoid tension on the nerve ends, may be employed at the discretion of the surgeon. To secure adequate fixation of the nerve ends in the nerve guide, the accepted surgical technique of flat, square ties with additional throws as warranted by surgical circumstance and the experience of the surgeon, is required.

Suturing Technique

1. Place the Neurolac nerve guide in warm saline (37°C) for approximately 1 minute before implantation. This will make the tube more flexible and ease needle passage during suturing.
2. Suture the Neurolac nerve guide by passing the suture (8-0 suture) first through the tube from the outside to the inside and then transversally and superficially through the epineurium and back through the tube from the inside to the outside, after which a tie is made (Fig. 1.1-1.3).
3. When positioning optimization of the nerve ends in the nerve guide is required, it is recommended to place a second suture in the same nerve end (Fig. 1.4).
4. Pull the proximal nerve stump into the nerve guide.

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NOTE: It is recommended that the nerve ends are pulled into the tube for at least 3 mm for optimal nerve regeneration.

5. Fill the tube with heparinized saline, using a solution containing 1000 units of heparin per 100 ml of normal saline (Fig 1.5).
6. Subsequently, use the same procedure, to pull the distal nerve stump into the nerve guide.
7. A minimum space of 5 mm should be left between the nerve ends in the nerve guide.
8. Fill any remaining space with heparinized saline (Fig 1.6) by injecting along the nerve into the lumen of the tube or by penetrating the tube (not the nerve).

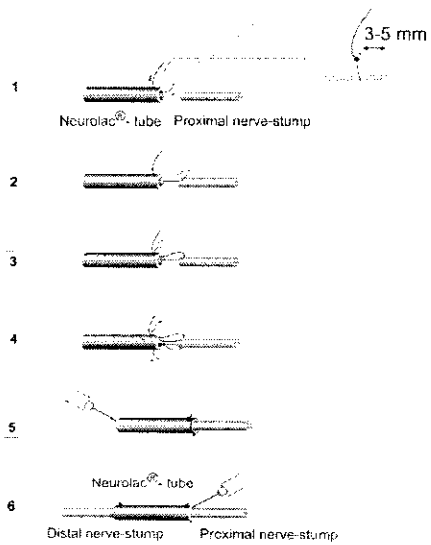

Figure 1. Schematic representation of suture technique for suturing the nerve ends into the nerve guide.

CAUTION: Ensure that no blood enters the nerve guide lumen since this may hinder nerve recovery.
CAUTON: The nerve guide should be implanted and sutured with all joints in an extended position as to assure that no tension occurs on the proximal or distal nerve end when joints are being mobilized.

9. Close the wound and splint to prevent kinking for the first three postoperative weeks. Long-term compression of the nerve guide should be avoided. Patients may be administered oral antibiotics for the first post-operative week.

Dispose contaminated implantation and packaging materials utilizing standard hospital procedures and universal precautions for bio-hazardous waste.

⚠	=	Refer to accompanying instructions for use.
⧗	=	Use by
REF	=	Catalog number
2	=	For single use only
LOT	=	Lot number
STERILE	=	Sterile product
STERILE EO	=	Sterilized by ethylene oxide

Polyganics BV
L.J. Zielstraweg 1
9713 GX Groningen
The Netherlands

Telephone +31 50 588 6588
Fax +31 50 588 6599

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