

DEPARTMENT OF HEALTH AND HUMAN SERVICES FOOD AND DRUG ADMINISTRATION MEDICAL DEVICE USER FEE COVER SHEET	PAYMENT IDENTIFICATION NUMBER: Write the Payment Identification number on
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A completed Cover Sheet must accompany each original application or supplement subject to fees. The following actions must be taken to properly submit your application and fee payment:

1. Electronically submits the completed Cover Sheet to the Food and Drug Administration (FDA) before payment is sent.
2. Include printed copy of this completed Cover Sheet with a check made payable to the Food and Drug Administration. Remember that the Payment Identification Number must be written on the check.
3. Mail Check and Cover Sheet to the US Bank Lock Box, FDA Account, P.O. Box 956733, St. Louis, MO 63195-8733. (Note: In no case should payment be submitted with the application.)
4. If you prefer to send a check by a courier, the courier may deliver the check and Cover Sheet to: US Bank, Attn: Government Lockbox 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.)
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6. Include a copy of the complete Cover Sheet in volume one of the application when submitting to the FDA 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) REGEN BIOLOGICS INC 509 Commerce Street East Wing Franklin Lakes NJ 07417 US	2. CONTACT NAME Margaret Crowe 2.1 E-MAIL ADDRESS mcrowe@regenbio.com 2.2 TELEPHONE NUMBER (include Area code) 201-651-3508 2.3 FACSIMILE (FAX) NUMBER (include Area code) 201-651-5141
1.1 EMPLOYER IDENTIFICATION NUMBER (EIN) 	

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/dc/mdufma>)

Select an application type:

- Premarket notification(510(k)); except for third party
- Biologics 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.

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

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 (FOR FISCAL YEAR 2005)

\$4,158.00 22-Dec-2006



REGEN

Biologics

December 22, 2006

US Bank



Re: ReGen Biologics Inc. Premarket Notification



To Whom it May Concern:

Enclosed please find check number  in the amount of \$4,158.00 made payable to the Food and Drug Administration for the premarket notification ReGen Collagen Scaffold (CS). The premarket notification is being submitted under separate cover today to the Food and Drug Administration.

If you require any additional information regarding this payment please contact the undersigned at 201-651-3508, or via electronic mail at mcrowe@regenbio.com.

Thank you very much for your prompt attention to this matter.

Sincerely,

Margaret F. Crowe
Senior Clinical Affairs Manager

4,158.00

MD6029119-956733

Trust Company-DDA



ReGen

Biologics

510(k) Document Mail Center
Food and Drug Administration
Center for Devices and Radiological Health
9200 Corporate Boulevard
Rockville, MD 20850

December 22, 2006

SUBMISSION: Traditional Premarket Notification 510(k)

DEVICE: ReGen Collagen Scaffold (CS)

APPLICANT: ReGen Biologics, Inc.

**OFFICIAL
CORRESPONDENT:** John Dichiara

**USER FEE
PAYMENT ID:**

**SMALL BUSINESS
DECISION #:**

Dear Sir or Madam:

In accordance with the provisions of Section 510(k) of the Federal Food, Drug and Cosmetic Act, notification is hereby made of ReGen Biologics, Inc.'s intent to manufacture and distribute a device designated as the ReGen[®] Collagen Scaffold (CS). The information required by 21 CFR Part 807 is provided in this 510(k) Premarket Notification Submission, and identified in the 510(k) checklist that precedes the substantive submission.

In accordance of Dr. Tillman's letter of November 3, 2006 to ReGen Biologics, the company is submitting this 510(k) premarket notification to show that its surgical mesh for general use and use in the meniscus is substantially equivalent to predicate devices and the determination of substantial equivalence is support by appropriate data and information included in the submission, including clinical data. Specifically, ReGen has identified and presented appropriate clinical data that establishes that the CS, for use under the specific conditions of use outlined in proposed labeling, is as safe and effective as legally marketed surgical mesh.

The Collagen Scaffold (CS) is a resorbable collagen-based surgical mesh. It serves to reinforce and repair soft tissue where weakness exists in general surgical procedures, including, but not limited to, general soft tissue defects, hernias, and meniscus tissue. The proposed classification is:

878.3300 – FTM, Surgical Mesh – Class II

The CS is substantially equivalent to legally marketed surgical meshes, including the DePuy Restore Orthobiologic Implant (K031969, K001738 and K982330), Cook Biotech SIS Fistula Plug (K050337), the TEI Biosciences TissueMend and OrthoMend (K031188 and K051766), the Cook Biotech Surgisis Mesh (K974540, K980431, K992159, K034039), the Kensey Nash BioBlanket Surgical Mesh (K043259 and K041923), the Tissue Science Laboratories ZCR Patch (K992556, K013625, K021056, K043366, K050355), the OsteoBiologics IMMIX Film (K024199 and K032673), the Cook Biotech SIS Plastic Surgery Matrix (K034039), the Artimplant Sportmesh (K052830), the Spineology Optimesh (K014200), and the Davol Marlex Mesh (Pre-amendment).

This submission contains confidential commercial and trade secret information, and we respectfully request that it be given the maximum protection afforded by law.

Should you have any questions regarding this submission, please contact me at (201) 651-3505 or via e-mail at jdichiara@regenbio.com.

Respectfully submitted,



John Dichiara
Sr. Vice President
Regulatory, Clinical and Quality

PREMARKET NOTIFICATION [510(k)]

REGEN COLLAGEN SCAFFOLD (CS)

Applicant:

**ReGen Biologics, Inc.
509 Commerce Street, East Wing
Franklin Lakes, NJ 07417**

Official Correspondent:

**John Dichiara
Telephone: (201) 651-5141
Fax: (201) 651-5141
jdichiara@regenbio.com**

**PREMARKET NOTIFICATION [510(k)] SUBMISSION
REGEN COLLAGEN SCAFFOLD (CS)**

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**SCREENING CHECKLIST
FOR ALL PREMARKET NOTIFICATION [510(k)] SUBMISSIONS**

510(k) Number: _____

The cover letter clearly identifies the type of 510(k) submission as (Check the appropriate box):

- Special 510(k) Do Sections 1 and 2
- Abbreviated 510(k) Do Sections 1, 3 and 4
- Traditional 510(k) or no identification provided Do Sections 1 and 4

Section 1: Required Elements for All Types of 510(k) submissions:

	Present or Not Applicable	Inadequate or Missing
Cover letter, containing the elements listed on page 3-2 of the Premarket Notification [510(k)] Manual.	YES, see Cover Letter	
Table of Contents.	YES	
Truthful and Accurate Statement.	YES, see Section 4.0	
Device's Trade Name, Device's Classification Name and Establishment Registration Number.	YES, see Cover Letter	
Device Classification Regulation Number and Regulatory Status (Class I, Class II, Class III or Unclassified).	YES, see Cover Letter	
Proposed labeling including the material listed on page 3-4 of the Premarket Notification [510(k)] Manual.	YES, see Section 6.0	
Statement of Indication for Use that is on a separate page in the premarket submission.	YES, see Section 2.0	
Substantial Equivalence Comparison, including comparisons of the new device with the predicate in areas that are listed on page 3-4 of the Premarket Notification [510(k)] Manual.	YES, see Section 10.0	
510(k) Summary or 510(k) Statement.	YES, see Section 3.0	
Description of the device (or modification of the device) including diagrams, engineering drawings, photographs or service manuals.	YES, see Section 5.0	
Identification of legally marketed predicate device.*	YES, Cover Letter and Section 10.0	

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	Present or Not Applicable	Inadequate or Missing
Compliance with performance standards.* [See Section 514 of the Act and 21 CFR 807.87 (d).]	N/A	
Class III Certification and Summary. **	N/A	
Financial Certification or Disclosure Statement for 510(k) notifications with a clinical study. * [See 21 CFR 807.87 (i)]	N/A	
510(k) Kit Certification.***	N/A	

* May not be applicable for Special 510(k)s.

** Required for Class III devices, only.

*** See pages 3-12 and 3-13 in the Premarket Notification [510] Manual and the Convenience Kits Interim Regulatory Guidance.

Section 4: Additional Requirements for ABBREVIATED and TRADITIONAL 510(k) submissions (If Applicable):

	Present or Not Applicable	Inadequate or Missing
a) Biocompatibility data for all patient-contacting materials, OR certification of identical material/formulation:	YES, See Section 8.0	
b) Sterilization and expiration dating information:	YES, See Section 7.0	
i) sterilization process	See Section 7.1	
ii) validation method of sterilization process	See Section 7.2	
iii) SAL	See Section 7.1	
iv) packaging	See Section 6.1	
v) specify pyrogen free	See Section 7.3	
vi) ETO residues	N/A	
vii) radiation dose	See Section 7.1	
c) Software Documentation:	N/A	

Items with checks in the "Present but Deficient" column require additional information from the sponsor. Items with checks in the "Missing" column must be submitted before the substantive review of the document.

Passed Screening Yes No

Reviewer: _____

Concurrence by Review Branch: _____

Date: _____

1.0 EXECUTIVE SUMMARY

This Executive Summary was prepared and is being provided in consideration of the recently issued Food and Drug Administration (“FDA” or “the Agency”) guidance document entitled *Guidance for Industry and FDA Staff: Format for Traditional and Abbreviated 510(k)s*.¹ It provides information intended to facilitate the Agency’s review of this 510(k). Furthermore, it presents a regulatory context in which FDA reviewers can fully understand the approach taken by the submitter in demonstrating substantial equivalence.

1.1 Objectives

ReGen Biologics, Inc. (“ReGen”) has 3 primary objectives in submitting a premarket notification [510(k)] submission to FDA. Specifically, ReGen intends to:

- Demonstrate that the Collagen Scaffold (CS) is substantially equivalent to other legally marketed surgical mesh devices intended to reinforce and repair soft tissue for clinical applications in various anatomical locations;
- Obtain clearance from FDA to market this surgical mesh product in the United States; and
- Comply with relevant FDA premarket notification requirements necessary to provide reasonable assurance that the CS is as safe and effective as legally marketed predicate surgical meshes for its intended use, consistent with the least burdensome requirements of the Federal Food, Drug, and Cosmetic Act (“the Act”).

1.2 Background

1.2.1 The Company

Founded in 1990, ReGen is headquartered in Franklin Lakes, New Jersey, and operates an ISO 13485 certified manufacturing facility in Redwood City, California. ReGen manufactures and markets a surgical mesh product in Europe and Australia, under the trade name Collagen Meniscus Implant (CMI). The CMI is identical to the semi-lunar configuration of the CS and is intended for use to reinforce meniscus defects and function as a resorbable scaffold for replacement by the patient’s own tissue.

¹ ODE and OIVD, CDRH. *Guidance for Industry and FDA Staff: Format for Traditional and Abbreviated 510(k)s*. August 12, 2005. <<http://www.fda.gov/cdrh/ode/guidance/1567.html>>.

1.2.2 The Device

The ReGen Collagen Scaffold (CS) is a resorbable collagen-based surgical mesh composed primarily of bovine type I collagen. Like predicate surgical meshes, it serves to reinforce damaged or weakened soft tissue and provides a resorbable scaffold for replacement by the patient's own soft tissue. The CS is not a prosthetic device and it is not intended to replace normal body structures or functions.

The device is provided in two configurations: a flat sheet which is intended for use in general soft tissue defects, including hernias and a semi-lunar shape which is intended for use in the meniscus. In each instance, the surgeon assesses the defect and trims the device to the size necessary for repair of the damaged or weakened soft tissue. The flat sheet is sutured in place either during an open surgery or laproscopically. The semi-lunar configuration is designed to be sutured in place through a minimally invasive arthroscopic procedure to reinforce a defect in the human meniscus, thus decreasing the amount of trimming and shaping required by the surgeon at the time of surgery. This is not unlike the pre-shaped three dimensional configuration of the Cook Fistula Plug, the strand configuration of the Cook SIS Facial Implant, or the pre-configured meshes used in specific types of hernia repair (such as for inguinal or paraesophageal hernia repair).

In repairing and reinforcing meniscal defects, the patient must have an intact meniscal rim and anterior and posterior horns for attachment of the mesh. In addition, the surgically prepared site for the CS must extend at least into the red/white zone of the meniscus to provide sufficient vascularization. Neither its labeling nor indications for use suggest the device should be used to replace healthy tissue or tissue that can be repaired. Simply put, a partial meniscectomy, the standard of care for these injuries, would be performed whether or not the CS device is used. Because the CS provides reinforcement of the meniscal horns, the amount of tissue removed when using the device is usually less than when a partial meniscectomy is performed without the use of the CS.

1.2.3 Regulatory History

Introduction





History of FDA Interactions



Regulatory Basis for a 510(k) Submission

Over the last 9 years, FDA has rendered numerous decisions on predicate surgical mesh products (21 CFR 878.3300) that provide the basis for regulating the CS for use in the meniscus as a Class II device. Based on the regulation and the precedents established by FDA, the CS is a class II surgical mesh just like those other absorbable meshes placed

into class II by FDA. Precedents that establish the appropriateness of pursuing marketing clearance through a 510(k) include the following:

- The intended use of the CS, as a surgical mesh, is the same as the intended use (reinforcement of soft tissue where weakness exists) of identified predicate surgical mesh devices cleared by FDA.
- FDA has cleared multiple 510(k)s for predicate surgical mesh devices that are technologically similar to the CS and are used in multiple medical specialties, including general surgery and orthopedics, for soft tissue reinforcement and repair.

Accordingly, FDA determinations over the last ten years show that class II regulatory controls provide reasonable assurance of the safety and effectiveness for surgical meshes like the CS, resulting in the conclusion that the 510(k) process is the premarket review path for the CS mesh. The basis for substantial equivalence, along with the relevant regulatory precedents, is described in more detail below. In addition, Dr. Tillman has indicated to the company that regulation of the CS for use in the meniscus can be cleared through a 510(k) with appropriate clinical data to support that it is as safe and effective as predicate surgical meshes.

1.3 Basis for Substantial Equivalence

The ReGen CS has the same intended use and similar technological characteristics to predicate surgical mesh devices, including the following:

- Restore Orthobiologic Implant (K031969, K001738 and K982330);
- SIS Fistula Plug (K050337);
- TissueMend, OrthoMend (K031188 and K051766);
- Surgisis Mesh (K974540, K980431, K992159, K034039);
- BioBlanket Surgical Mesh (K043259 and K041923);
- ZCR Patch, Permacol (K992556, K013625, K021056, K043366, K050355);
- IMMIX Film (K024199 and K032673);
- SIS Plastic Surgery Matrix (K034039)
- Sportmesh (K052830)
- Optimesh (K014200)
- Marlex Mesh (Pre-amendment).

The proposed indication for use statement for the ReGen CS is as follows:

The ReGen Collagen Scaffold (CS) is intended for use in general surgical procedures for the reinforcement and repair of soft tissues where weakness exists, including but not limited to, general soft tissue defects, hernias, and meniscus defects.

The CS is not a prosthetic device and it is not intended to replace normal body structure. In repairing and reinforcing meniscal defects, the patient must have an intact meniscal rim and

anterior and posterior horns for attachment of the mesh. In addition the surgically prepared site for the CS must extend at least into the red/white zone of the meniscus to provide sufficient vascularization.

The CS reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own tissue.

Surgical mesh is intended for use to reinforce soft tissue where weakness exists. Specific soft tissue indications throughout the body have been cleared by the Agency. The surgical mesh category includes devices that are indicated to seal or reduce air leaks in the lungs (K961440), treat urinary incontinence (K992159), provide a bridging material to obtain the desired surgical result in the repair of hernias or other fascial defects (K024199), provide a resorbable tissue scaffold for rotator cuff repair (K031969), provide a plug for anal and rectal fistulas (K050337) and to provide a means for containing bone graft material in vertebral body defects in the spine (K014200). All of these devices expanded the indications of a surgical mesh, having no prior predicate with the same indication. Each was found SE based on addressing safety and effectiveness concerns through bench testing, animal data and sometimes limited clinical data (See **Appendix C** for a discussion of the type of data provided for other cleared surgical meshes which introduced new indications for use). Importantly what made each of these meshes substantially equivalent to their predicates is that each had the same intended use as each predicate, although differing indication statements.

Specifically, focusing on each anatomic site or tissue of these various predicates, there may be different questions that arise; however, when focusing on any one device's ability to fulfill a surgical mesh's intended use to reinforce soft tissue, all of the safety and effectiveness questions are the same. In other words, a surgical mesh in the meniscus is no more distant from its predicate than a surgical mesh indicated for use in an anal fistula, the spine, a rotator cuff, or in lung repair. All of these uses are surgical mesh uses and that is what they have in common. FDA must compare the meniscus indication to its predicates in the same manner as the agency compared other new applications of surgical mesh to legally marketed devices.

ReGen has provided extensive data supporting the safety and effectiveness of its CS mesh for use in the meniscus; these data far exceed the amount and type of data provided by sponsors of predicate meshes to support their respective premarket notifications (See **Appendix C**). Testing



In evaluating the use of surgical mesh in the meniscus, a review was undertaken of the risks associated with the general use of surgical mesh for the previously cleared indications, as well as

those associated with the use of the CS in the meniscus. This evaluation included data from the following sources: labeling for predicate products, FDA's MAUDE Database, a US Multicenter Clinical Trial, international marketing experience and published data. It was clear from this comparison that the complications associated with the use of the CS in the meniscus are the same as those associated with other soft tissue indications for use of surgical mesh and, therefore, no new types of safety or effectiveness questions are raised.

The company's bench testing, animal studies and human clinical trials support the safety and substantial equivalence of the device. A table that summarizes the substantial equivalence based on intended use, materials, technological characteristics and performance data of the CS in comparison with the predicate devices is included as **Appendix D**.

1.4 Regulatory Precedents

The Food and Drug Modernization Act of 1997 ("FDAMA") amended the Act to require that the Agency employ the "least burdensome" means of bringing new devices to market. In considering the least burdensome regulatory pathway to market for the CS, ReGen thoroughly researched precedents to identify the relevant FDA requirements that the Agency has applied to devices presenting similar safety and effectiveness issues.

In Dr. Tillman's response to the [redacted] he affirmed the NSE decision and in making that decision she determined that the CS is a surgical mesh that can be cleared for the indication statement provided in this submission with appropriate clinical data to demonstrate equivalent performance to predicate surgical meshes (**Appendix D**).

FDA has cleared numerous 510(k)s for resorbable implanted surgical mesh devices that are used in multiple medical specialties, including general surgery and orthopedics, for the same intended use as the CS, i.e., to reinforce and repair soft tissue, and with similar technological characteristics. The legally marketed predicate devices that are cited in the 510(k) are classified under Class II Surgical Mesh (21 CFR 878.3300). This classification regulation describes surgical mesh as "a metallic or polymeric screen intended to be implanted to reinforce soft tissue or bone where weakness exists." These devices are class II, subject to the 510(k) requirements. Over time, FDA has cleared devices under this classification regulation with varying specific indications for use statements and with materials other than metallic or polymeric screens.

Furthermore, pre-amendment use of surgical mesh in the intra-articular space of the knee is reported in the literature, by Parrish.² He reports on five cases in which Marlex Surgical Mesh was used in the knee, including intra-articularly, prior to the enactment of the device amendments in May of 1976. These include use in the repair of defects in the medial and lateral femoral condyles as well as the patella.

² Parrish F, Murray J, Urquhart B. 1978. The Use of Polyethylene Mesh (Marlex®) as an Adjunct in Reconstructive Surgery of the Extremities. *Clinical Orthopaedics and Related Research*. 1978;137: 276-286

Although not predicates for this device, the agency has also cleared absorbable and non-absorbable meniscus repair devices (darts, arrows and all-inside devices) for use in repair of the meniscus. These devices are regulated in Class II under 21 CFR 888.3030, *Single/multiple component metallic bone fixation appliances and accessories*. These meniscus repair devices were found substantially equivalent to metal bone plates and screws, and are more distant from their predicates than any surgical mesh, including the CS, from its respective predicates. While the intended use of these devices differs from the CS, there are similarities to the CS with respect to the use of absorbable devices within the meniscus and use in the articulation of knee.

Furthermore, FDA has recently promulgated two Class II Special Controls Guidance Documents that are relevant to the CS being cleared through the 510(k) process. While CDRH did not include the CS within these specific special controls guidance documents, there is no logic to exclude it because it has the same intended uses and characteristics. It shares similarities with the device cover by the guidance, which further supports regulation of the CS as a class II device. The covered devices are resorbable implanted devices used in orthopedic and dental applications for similar uses as the CS, that is, reinforcement, filling voids and providing a scaffold for tissue remodeling. Many devices have been cleared in each of these generic device types that are comprised of bovine collagen, like the CS, with similar technological characteristics. These are:

- Class II Bone Void Filler (21 CFR 888.3045)

The classification regulation describes bone void filler as “a resorbable implant intended to fill bony voids or gaps of the extremities, spine, and pelvis that are caused by trauma or surgery and are not intrinsic to the stability of the bony structure.” These devices are class II and subject to 510(k) requirements.³

- Class II Dental Bone Grafting Material (21 CFR 872.3930)

The classification regulation describes dental bone grafting material as “a material such as hydroxyapatite, tricalcium phosphate, polylactic and polyglycolic acids, or is intended to fill, augment, or reconstruct periodontal or bony defects of the oral and maxillofacial region.”⁴

In sum, FDA understands that collagen-based products may be readily controlled in class II to ensure safety and effectiveness. In other words, collagen-based scaffolds used in the meniscus and intra-articular space of the knee, likewise, can be controlled in class II.

³ Division of General, Restorative, and Neurological Devices, ODE, CDRH. *Class II Special Controls Guidance Document: Resorbable Calcium Salt Bone Void Filler Device; Guidance for Industry and FDA*. June 2, 2003. <<http://www.fda.gov/cdrh/ode/guidance/855.html>>.

⁴ Dental Devices Branch, Division of Anesthesiology, Infection Control, General Hospital, and Dental Devices, ODE, CDRH. *Guidance for Industry and FDA Staff. Class II Special Controls Guidance Document: Dental Bone Grafting Material Devices*. April 28, 2005. <<http://www.fda.gov/cdrh/ode/guidance/1512.pdf>>.

1.5 Conclusion

The CS is substantially equivalent to other legally marketed class II surgical mesh devices cleared for use in various medical applications. It has similar composition, technological characteristics and intended use of cleared predicate surgical mesh devices. ODE has determined that the CS is a Class II device and can be cleared for the proposed intended use with appropriate clinical data. While no predicate surgical mesh has been cleared for use in the meniscus, the Agency has cleared a number of specific indications within the general intended use of surgical mesh and the differences associated with those various indications are no greater than the difference between the indication of the identified predicates and the CS for use in the meniscus. The indication for use of the CS in the treatment of meniscus injuries presents no new types of safety and effectiveness questions as demonstrated by bench testing, animal studies, extensive clinical data and a review of adverse events associated with the use of the device compared to known complications associated with its predicates. Class II special controls have been used in the regulation of other devices used in the meniscus, as well as other devices used to fill voids or defects in orthopedic and dental applications. The CS, therefore, should be classified as a surgical mesh under 21 CFR 878.3300, and regulated by class II controls.

2.0 INDICATIONS FOR USE

510(k) Number (if known): _____

Device Name: ReGen Collagen Scaffold (CS)

Indications for Use:

Prescription Use _____
(Part 21 CFR 801 Subpart D)

AND/OR

Over-The-Counter Use _____
(21 CFR 801 Subpart C)

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

Concurrence of CDRH, Office of Device Evaluation (ODE)

Page 1 of ____

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3.0 510(K) SUMMARY FOR COLLAGEN SCAFFOLD (CS)

Submission Prepared: 12/22/2006

Applicant Information

John Dichiara
Senior Vice President
Regulatory, Clinical, and Quality
ReGen Biologics, Inc.
509 Commerce Street, East Wing
Franklin Lakes, NJ 07417

Device Information

Device Name: ReGenCollagen Scaffold (CS)
Common Name: Surgical Mesh
Classification Name: Surgical Mesh, 21 CFR 878.3300
Classification Code: FTM
Reviewing Panel: Orthopedic Devices

Predicate Devices

- Restore Orthobiologic Implant, DePuy Orthopaedics, Inc.
(K031969, K001738 and K982330);
- SIS Fistula Plug, Cook Biotech, Inc.
(K050337);
- TissueMend, OrthoMend, TEI Biosciences, Inc.
(K031188 and K051766);
- Surgisis Mesh, Cook Biotech, Inc.
(K974540, K980431, K992159, K034039);
- BioBlanket Surgical Mesh, Kensey Nash, Corp.
(K043259 and K041923);
- ZCR Patch, Permacol, Tissue Science Laboratories PLC
(K992556, K013625, K021056, K043366, K050355);

CONFIDENTIAL

- IMMIX Film, OsteoBiologics, Inc. (K024199 and K032673);
- SIS Plastic Surgery Matrix, Cook Biotech, Inc. (K034039)
- Sportmesh, Artimplant (K052830)
- Optimesh, Spineology, Inc. (K014200)
- Marlex Mesh, Davol, Inc. (Pre-amendment).

Device Description

The ReGen Collagen Scaffold (CS) is a resorbable collagen matrix comprised primarily of bovine type I collagen. The CS is provided in a flat sheet configuration and in a semi-lunar shape with a triangular cross section to be used to reinforce weakened soft tissue and provide a resorbable scaffold that is replaced by the patient's own tissue. In all cases, the surgeon trims the device to the size necessary for repair of the damaged or weakened soft tissue.

Intended Use

The ReGen Collagen Scaffold (CS) is intended for use in general surgical procedures for the reinforcement and repair of soft tissues where weakness exists, including but not limited to, general soft tissue defects, hernias, and meniscus defects.

The CS is not a prosthetic device and it is not intended to replace normal body structure. In repairing and reinforcing meniscal defects, the patient must have an intact meniscal rim and anterior and posterior horns for attachment of the mesh. In addition the surgically prepared site for the CS must extend at least into the red/white zone of the meniscus to provide sufficient vascularization.

The CS reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own tissue.

Substantial Equivalence

The ReGen Biologics Collagen Scaffold (CS) has the same intended use and similar technological characteristics to the predicate surgical mesh devices, including; the DePuy Restore® Orthobiologic Soft Tissue Implant (K982330, K001738, K031969), the Cook Biotech SIS Fistula Plug (K050337), the TEI Biosciences TissueMend and OrthoMend (K031188, K051766), the Cook Biotech Surgisis Mesh, the Kensey Nash BioBlanket™ Surgical Mesh (K043259, K041923), the Tissue Sciences Laboratories' Permacol and ZCR Patch (K992556,

K013625, K021056, K043366, K050355), the Organogenesis CuffPatch (K042809), the Cook Biotech SIS Plastic Surgery Matrix (K034039), the Artimplant Sportmesh (K052830) and the Spineology Optimesh (K014200). Any differences identified do not raise new types of safety or effectiveness questions. The questions common to all resorbable surgical meshes have been addressed in this submission by biomechanical, biocompatibility, animal testing, as well as clinical experience with the device.

Conclusion

The CS is substantially equivalent to the predicate devices with respect to intended use, material of composition, and technological characteristics.

4.0 TRUTHFUL AND ACCURATE STATEMENT

As Required per 21 CFR 807.87(k)

I certify that, in my capacity as Senior Vice President of ReGen Biologics, I believe to the best of my knowledge, that all data and information submitted in the premarket notification are truthful and accurate and that no material fact has been omitted.

John Dichiaro

5.0 DEVICE DESCRIPTION

5.1 Device Name and Overview

The ReGen Collagen Scaffold (CS) is a resorbable collagen-based surgical mesh composed primarily of bovine type I collage. Like predicate surgical meshes, it serves to reinforce damaged or weakened soft tissue and provides a resorbable scaffold for replacement by the patient's own soft tissue. The CS is not a prosthetic device and it is not intended to replace normal body structure or function.

The device is provided in two configurations: a flat sheet which is intended for use in general soft tissue defects, including hernias and a semi-lunar shape which is intended for use in the meniscus. The flat sheet is sutured in place either during an open surgery or laproscopically, while the semi-lunar meniscus configuration is sutured in place through a minimally invasive arthroscopic procedure. In all cases, the surgeon trims the device to the size necessary for repair of the damaged or weakened soft tissue.

In repairing and reinforcing meniscal defects, the patient must have an intact meniscal rim and anterior and posterior horns for attachment of the mesh. In addition the surgically prepared site for the CS must extend at least into the red/white zone of the meniscus to provide sufficient vascularization. Neither it's labeling nor indications for use suggest the device should be used to replace healthy tissue or tissue that can be repaired. Simply put, a partial meniscectomy, the standard of care for these injuries, would be performed whether or not the CS device is used. Because the CS provides reinforcement of the meniscal horns, the amount of tissue removed when using the device is usually less than when a partial meniscectomy is performed without the use of the CS.

5.2 Material Components

The CS is comprised primarily of

5.2.1 Collagen

5.2.2



5.2.3

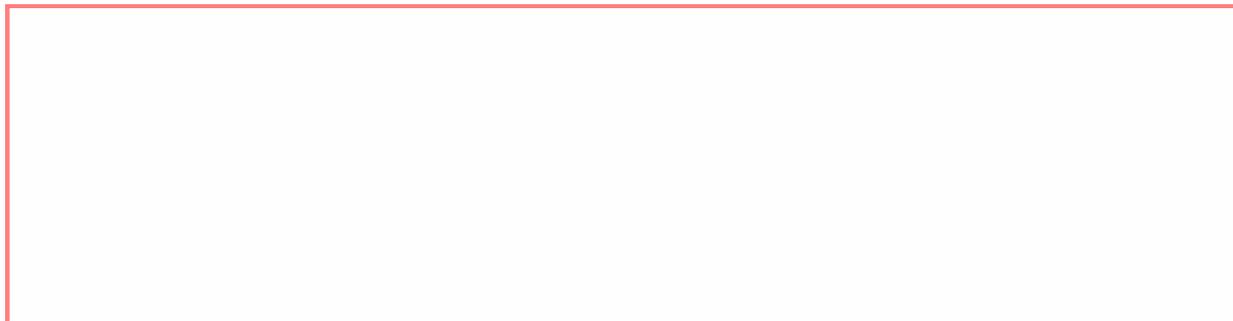


5.3 Product Characterization

5.3.1 Physical Dimensions

The CS is provided in a flat sheet configuration with sizes ranging up to 20x20 cm and from 1 to 6 mm in thickness, and in a semi-lunar shape with a triangular cross section to be used in the meniscus. Whether in sheet or semi-lunar form, the surgeon trims the device to the size necessary for repair of the damaged or weakened soft tissue.

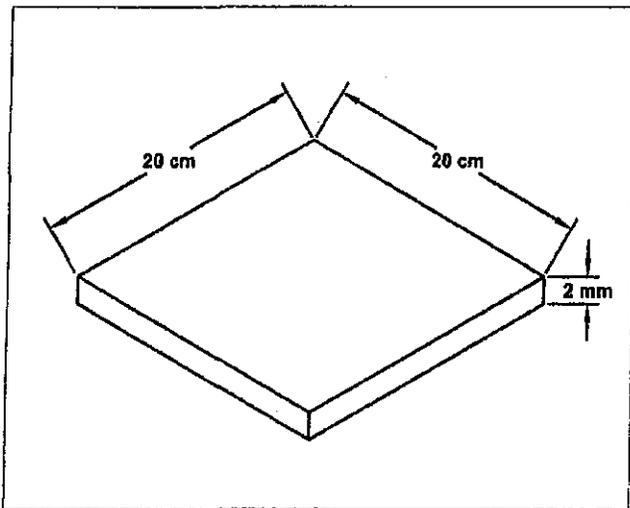
5.3.2 Physical Characteristics





5.4 Drawings of Device

5.4.1 Sheet Configuration



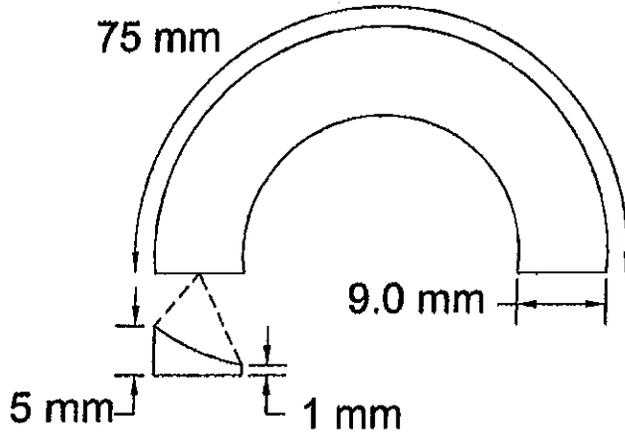
Representative drawing of a sheet configuration of the device for use in soft tissue and hernia reinforcement and repair.

⁵ Folkman J, Moscona, A. 1978. Role of cell shape in growth control. *Nature* 273:345-349.

⁶ Doillon CJ, Silver FH. 1986. Collagen-based wound dressing: effects of hyaluronic acid and fibronectin on wound healing. *Biomaterials* 7:3-8.

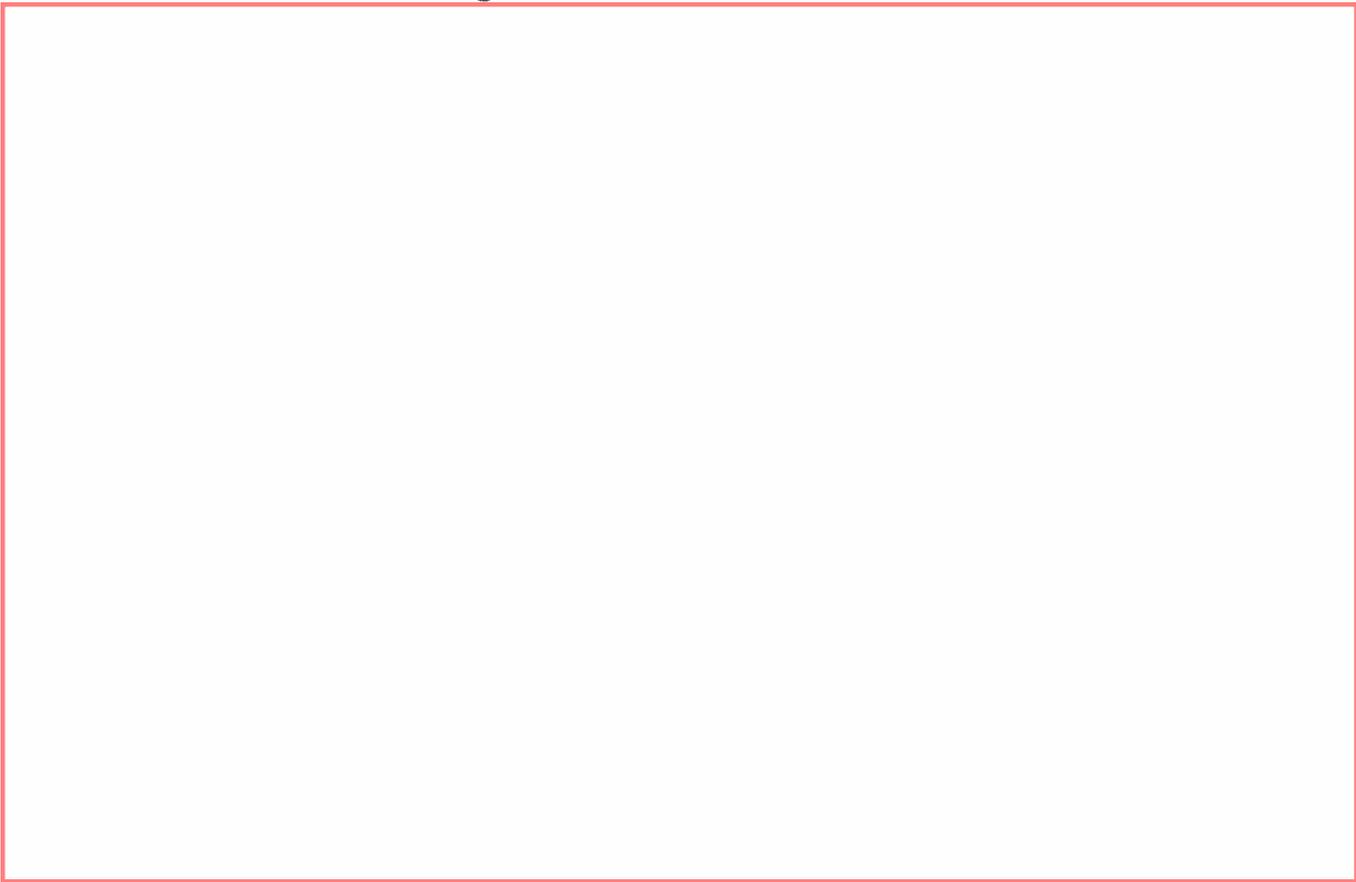
⁷ Cook SD, et al. 1991. Enhancement of bone ingrowth and fixation strength by hydroxylapatite coating porous implants. *Trans Orthop Res Soc* 16:550.

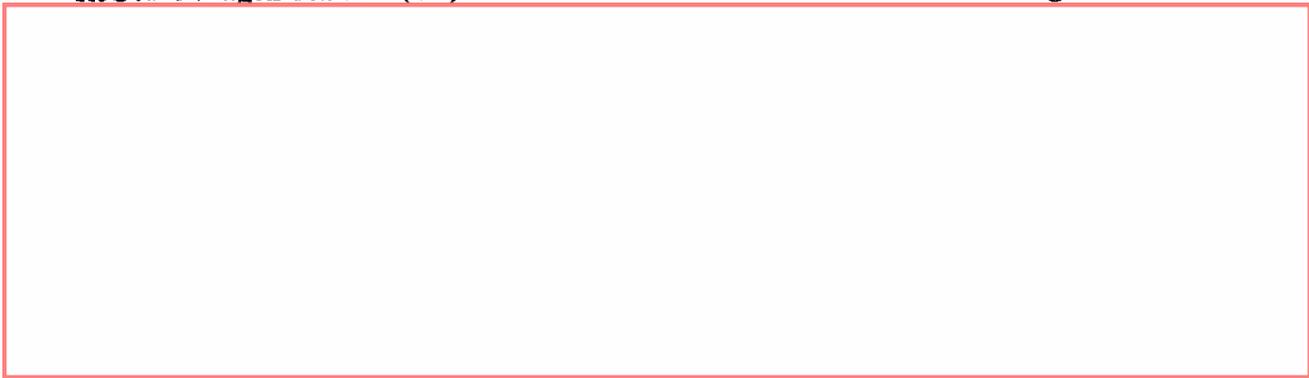
5.4.2 Semi-Lunar Form



Representative drawing of a semi-lunar configuration of the device for use in meniscus reinforcement and repair.

5.5 Device Manufacturing





6.0 PROPOSED LABELING, PACKAGING

6.1 Packaging and Shelf Life

The CS is packaged in a double-sealed thermoformed blister system. The inner blister is sealed using a Tyvek lid. The outer blister is sealed using a laminated foil lid. The system is validated to maintain a sterile barrier in accordance with EN 868 part 1.⁸ Physical package qualification has shown the package to be suitable to maintain the product characteristics and maintenance of sterility.

Shelf life of the CS is [REDACTED] months with a 95% confidence level. Statistical analysis of data generated from three CS stability studies was utilized to substantiate the shelf life. Materials entered into the studies were CS lots produced and tested using production methods and test methods equivalent to those used to manufacture product intended for commercial use.

Analysis was performed on the following test results provided by Quality Control release tests performed at various time [REDACTED] (real time) after storage at 25°C/uncontrolled humidity:

- Shrinkage Temperature Determination,
- Swelling Determination,
- Suture Pull-out Test,
- Formaldehyde Residual Test,
- Peel Test for package seals, and
- Appearance.

The product met its test requirements, s [REDACTED] the report of shelf life is included as **Appendix G**.

6.2 Draft Package Label

A sample package label is included in **Appendix H**.

6.3 Instructions for Use

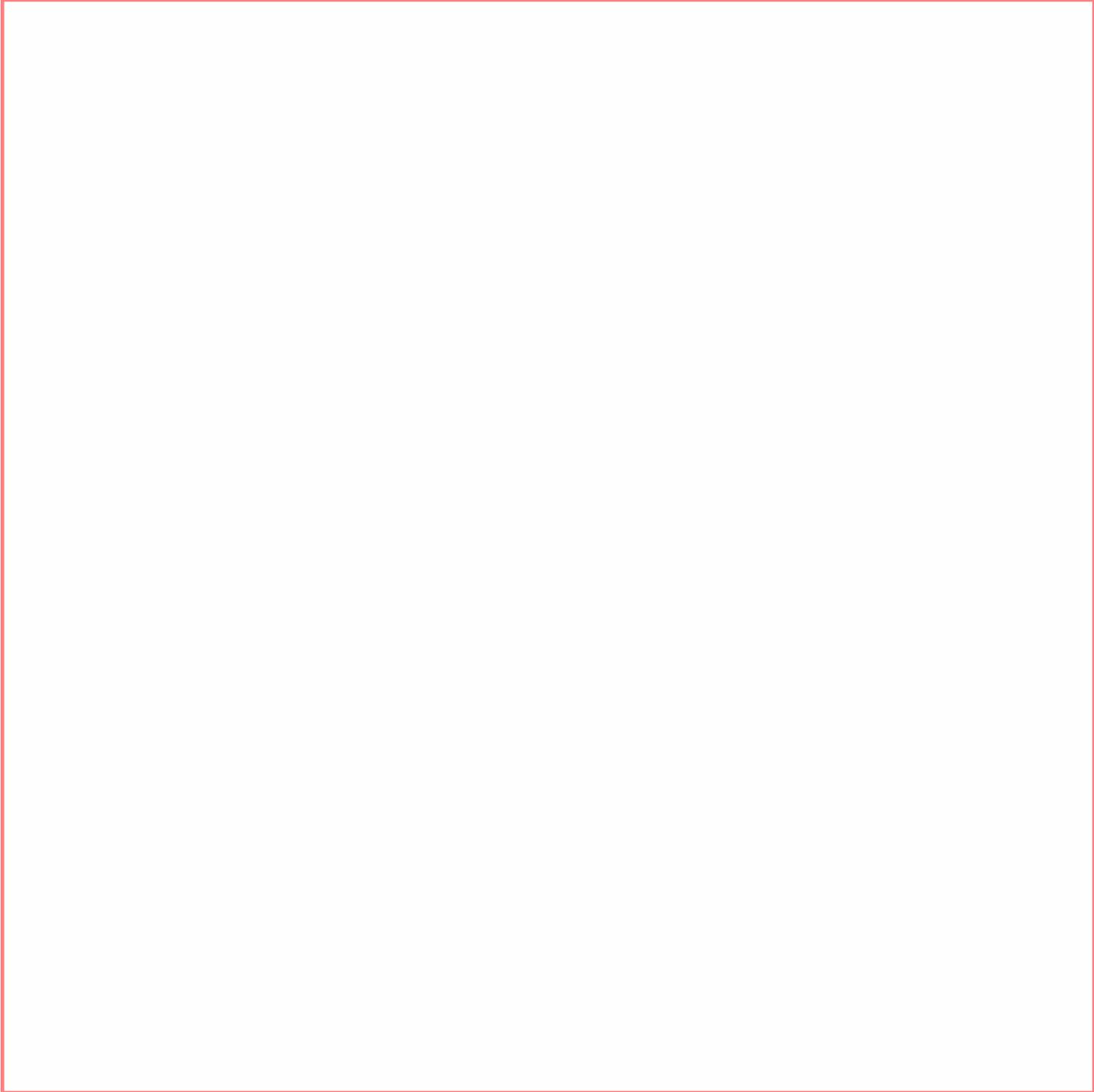
The draft Instructions for Use are included in **Appendix I**.

⁸ EN 868-1, *Packaging materials and systems for medical devices which are to be sterilized. General requirements and test methods.*

7.0 STERILIZATION INFORMATION



8.0 BIOCOMPATIBILITY TESTING



9.0 PERFORMANCE TESTING

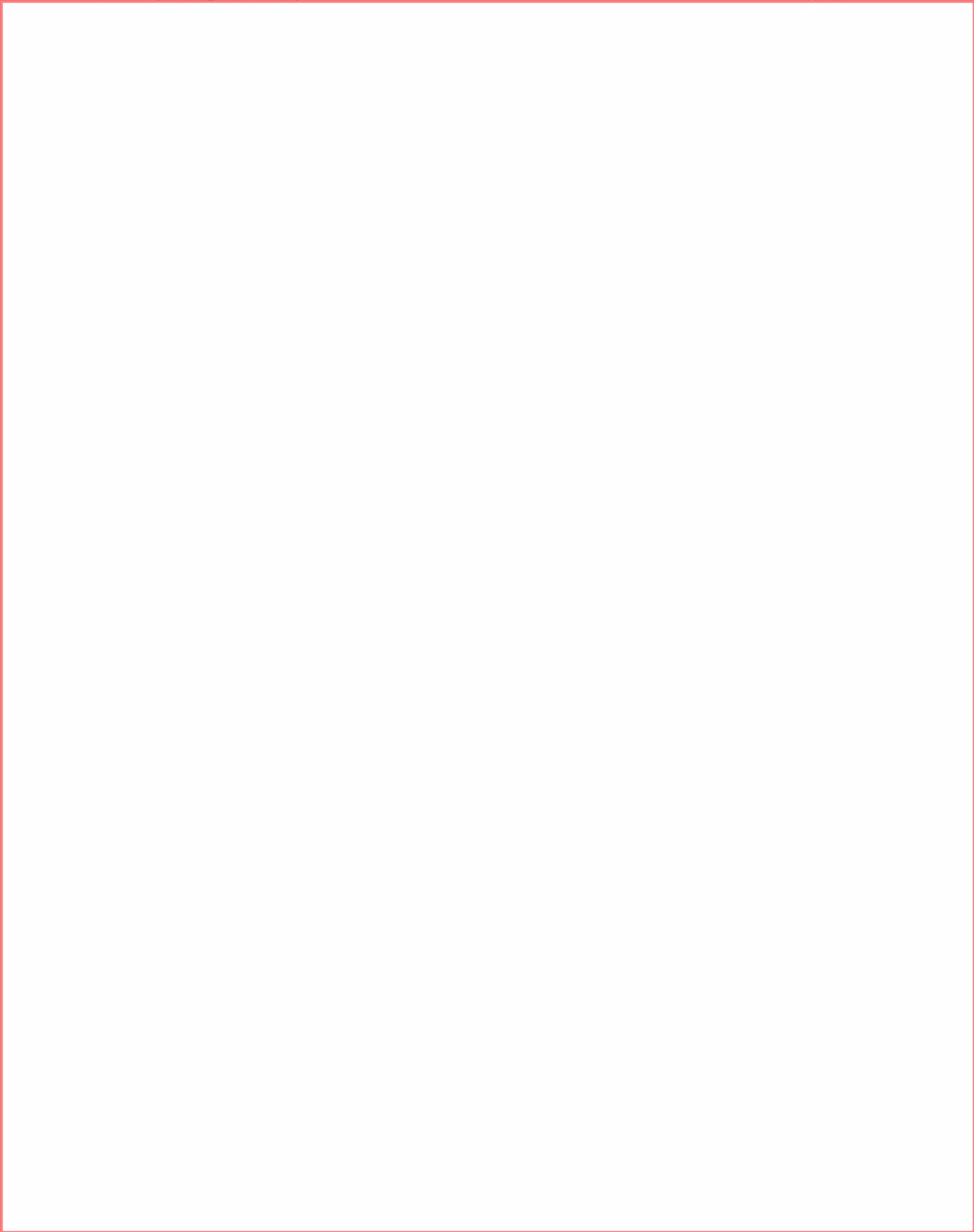
























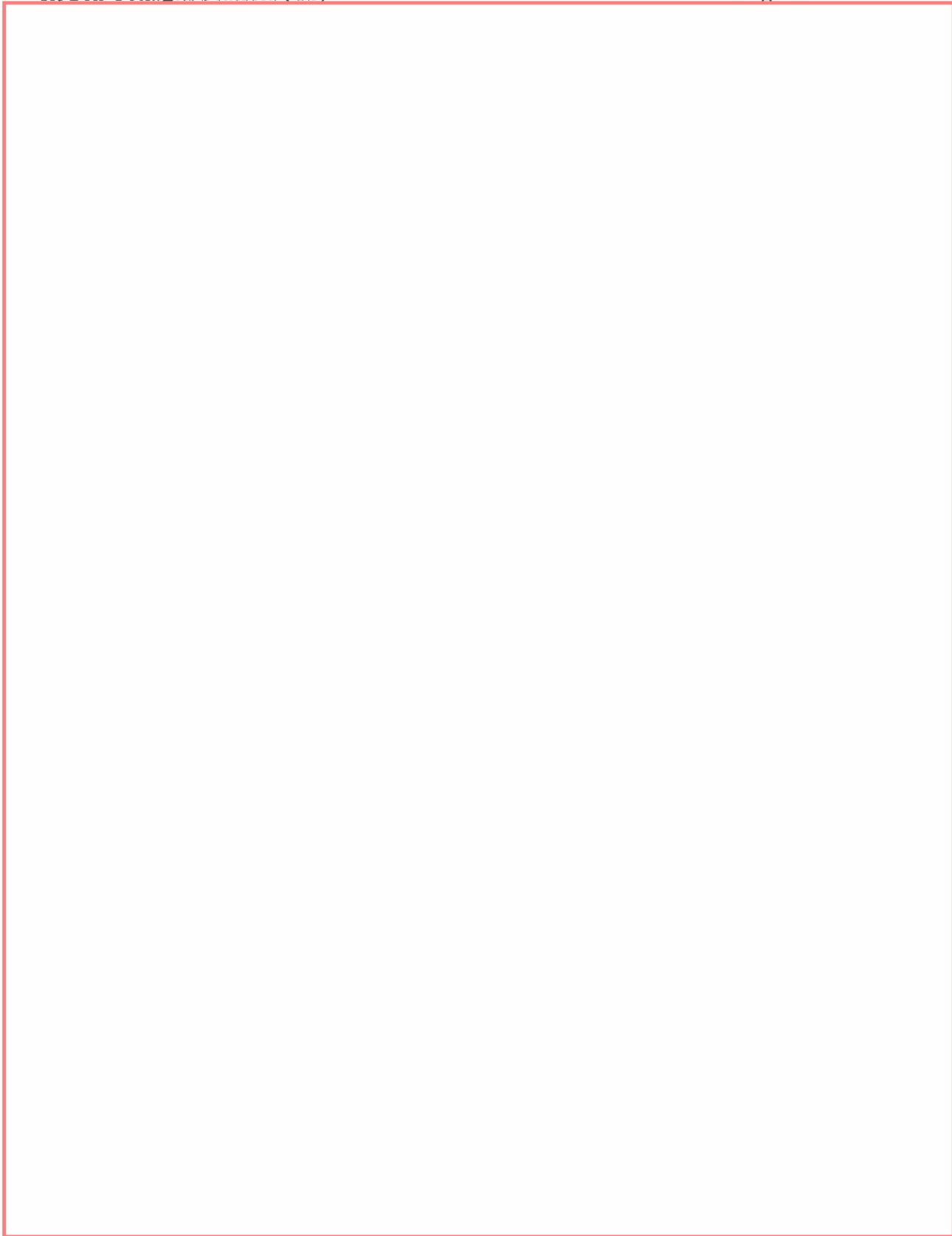




















10.0 SUBSTANTIAL EQUIVALENCE

A table summarizing the basis for the substantial equivalence of the CS to predicate devices is included as **Appendix D**.

10.1 Background

10.1.1 *Surgical Mesh Regulation*

Legally marketed surgical meshes are the predicate devices for the Collagen Scaffold (CS). The regulatory classification (21CFR§878.3300) describes a surgical mesh as “a metallic or polymeric screen intended to be implanted to reinforce soft tissue or bone where weakness exists.” Initially surgical meshes were either metal or polymeric materials that were permanent implants; however, over the last decade many of the 510(k) cleared surgical meshes have been manufactured from absorbable materials.

The FDA has cleared the indications for use of the following two resorbable meshes:

- The Restore device (K031969, K001738 and K982330); and
- The TissueMend product (K031188 and K051766).

Labeling for these devices included the statement that they are: “...not intended to replace normal body structure or provide the full mechanical strength to repair (the defect)...the (implant) reinforces soft tissue and provides a resorbable (or remodelable) scaffold that is replaced by the patient’s own tissue.” This wording shows that these surgical meshes were intended to act as resorbable tissue scaffolds and not as permanent reinforcing meshes.

This description and intended use of these resorbable surgical meshes coincides with the description and intended use of the CS. Simply put, the CS is a similar surgical mesh to these other resorbable products that are for use in an articulating joint.

10.1.2 *Evolution of Clearances for Surgical Mesh*

Initially soft tissue surgical mesh was constructed of non-absorbable polymeric materials. They were intended to be a permanent implant and add significant strength to weakened soft tissues. Clinically these materials were effective; however, they presented certain limitations, one of which was excessive stiffness either initially or after they were encapsulated by tissue. This stiffness resulted in surgical complications such as adhesions, erosion, restricted mobility and recurrence of the defects. Permanent synthetic implants also potentially act as a nidus for infection, and typically require removal to resolve the infection.

Resorbable materials were introduced to address these limitations. These materials did not have the inherent strength of the non-absorbable materials and they were not intended, "...to replace normal body structure or provide the full mechanical strength to repair..." the defect, as described in the Indications for Use for the DePuy and TEI Bioscience devices. These resorbable mesh devices are intended to, "...reinforce(s) soft tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue."

The clearance of resorbable meshes represented a clear shift from a non-absorbable, permanent device whose inherent properties were intended to provide permanent reinforcement to soft tissue defects. The resorbable soft tissue scaffolds had lower initial strengths but were designed to be replaced by the patient's own tissue during and after a period of restricted activity.

These resorbable scaffolds require sufficient strength to remain firmly attached to the host tissue and provide a stable environment for tissue growth and remodeling. They do not need the strength of the non-absorbable meshes because they are not intended to provide the full mechanical strength of the repair or to replace a normal body structure. While close tissue approximation is typically recommended as part of the surgical repair, it is not required and cannot be accomplished in many cases. These resorbable meshes are designed to bridge gaps in the tissue approximation and provide a scaffold for replacement by the patient's own tissue. It is that tissue which effects the repair and permanently reinforces the defect, not the mesh itself.

10.1.3. *Soft Tissue Indications*

From the initial indications of hernia repair and acetabular wall reconstruction, the Agency has cleared many products with specific indications for use under the general intended use of soft tissue reinforcement. The cleared indications for use of surgical mesh include:

- achilles tendon;
- anal fistulas;
- biceps tendon;
- bladder support;
- body wall defects;
- colon prolapse;
- enterocutaneous fistulas;
- facial defects;
- gastroenterological repair;
- lung resections;
- plastic & reconstructive procedures, including use in the face, head, neck;
- pubourethral support/urethral slings for treating urinary incontinence;
- treatment of Peyronie's disease;
- vertebral body of the spine.
- muscle flap reinforcement;
- patella tendon;
- pelvic floor reconstruction;
- quadriceps tendon;
- rectal fistulas;
- rotator cuff;
- sacrocolposuspension;
- soft tissue repair;
- suture line reinforcement;
- thoracic wall repair;

When focusing on each specific anatomic site or tissue there may be different questions that arise; however, when focusing on any one device's ability to fulfill the surgical mesh intended use to reinforce soft tissue, all of the pertinent safety and effectiveness questions are the same. In other words, a surgical mesh in the meniscus is no more distant from its predicate than a surgical mesh indicated for use in an anal fistula, the spine, a rotator cuff, or in lung repair. All of these uses are surgical mesh uses and that is what they have in common. FDA must compare the meniscus indication to its predicates in the same manner as the agency managed comparisons between other new applications of surgical mesh and legally marketed devices. In this submission, ReGen has provided more data describing the safety and effectiveness of its CS mesh than that submitted by sponsors of predicate meshes (APPENDIX C)

10.2 Predicate Devices

The following specific predicate devices are cited to establish the substantial equivalence of the CS based on intended use, technological characteristics and physical properties:

- Restore Orthobiologic Implant (K031969, K001738 and K982330);
- SIS Fistula Plug (K050337);
- TissueMend device (K031188 and K051766);
- Surgisis Mesh (K974540, K980431, K992159, K034039);
- BioBlanket Surgical Mesh (K043259 and K041923);
- ZCR Patch/Permacol (K992556, K013625, K021056, K043366, K050355);
- IMMIX Film (K024199 and K032673);
- SIS Plastic Surgery Matrix and SIS Facial Implant (K034039, K050246);
- Sportmesh (K052830)
- Optimesh (K014200)
- Marlex Mesh (pre-amendment).

A table summarizing the basis for the substantial of the CS to predicate devices is included as **Appendix D**.

10.3 The CS Has the Same Intended Use as FDA Cleared Surgical Meshes

The CS has the same intended use as the FDA cleared surgical meshes listed above. Like them, the CS is intended to reinforce soft tissue where weakness exists. Cleared surgical meshes perform this function in a number of ways. Some, like the Surgisis Mesh (K974540, K980431, K992159, K034039), the TissueMend device (K031188 and K051766) and the Restore implant (K031969, K001738 and K982330) reinforce the host tissue by being buttressed to the surface of tissue that is approximated. Some, reinforce by bridging a gap or filling a void like the IMMIX device (K024199 and K032673), the SIS Fistula Plug (K050337), the SIS Plastic Surgery Matrix (K034039) and the Restore implant (K031969, K001738 and K982330). The CS device

functions to reinforce soft tissue defects by both buttressing the remaining meniscus rim and horns, by bridging the gap between the meniscal rim and anterior and posterior horns and by filling the void left by the damaged meniscus tissue. All of this ultimately resulting in the CS providing a scaffold that is replaced by the patient's own tissue which serves to provide the long term reinforcement and repair of the meniscal defect.

The proposed instruction for use of the CS (**APPENDIX H**) include the following Indications for Use statement:

The ReGen Collagen Scaffold (CS) is intended for use in general surgical procedures for the reinforcement and repair of soft tissues where weakness exists, including but not limited to, general soft tissue defects, hernias, and meniscus defects.

The CS is not a prosthetic device and it is not intended to replace normal body structure. In repairing and reinforcing meniscal defects, the patient must have an intact meniscal rim and anterior and posterior horns for attachment of the mesh. In addition the surgically prepared site for the CS must extend at least into the red/white zone of the meniscus to provide sufficient vascularization.

The CS reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own tissue.

The CS is not intended to replace a normal body structure or provide the full mechanical strength to repair the meniscus. The CS is sutured to the intact native meniscus which must be present for device use, and does not replace that structure or its function. The intact native meniscus rim, with or without the CS, continues to provide the biomechanical function of the meniscus in the knee by virtue of its mechanical integrity and anterior and posterior attachments. Once sutured to the meniscal rim, the CS functions to reinforce the remaining meniscal rim and anterior and posterior horns.

Use of the CS in the meniscus for filling a soft tissue defect is also similar to use of the Cook Biotech Fistula Plug (K050337) in treating anal, rectal and enterocutaneous fistulas by filling a soft tissue defect. The Fistula Plug is three dimensionally shaped to fit a fistula, just as the semi-lunar configuration of the CS is three dimensionally shaped to fit a defect in the meniscus. In the indication for fistula repair, the device is used to fill a defect or void in the natural body structure in the same way that the CS fills a defect or void in the meniscus created by thinning or delamination resulting from meniscus injury. The Restore Device (K031969, K001738) is similarly used to fill a defect or void in the rotator cuff created by thinning or delamination of the tendon. In both cases, the devices are trimmed to size, sutured into the defect, and serve to reinforce the natural tissue structure. They also function as scaffolds to ultimately be replaced by the patient's own tissue which provides the long term reinforcement and repair of the defect by adding tissue volume to the thinned or deficient host tissue.

The CS bridges the gap between the meniscal rim and the anterior and posterior horns of the meniscus, like the IMMIX film which is indicated, "for the repair of hernia or other fascial

defects that require the addition of a reinforcing, or bridging material to obtain the desired surgical result.” Both devices function to reinforce the tissue defect by the addition of a scaffold that bridges the defect and is ultimately replaced by the patient’s own tissue which functions to permanently reinforce the defect by replacing lost tissue volume.

In addition, the Agency has cleared surgical mesh for indications in plastic and reconstructive surgery of the face and head (ZCR Patch – K013625) and for soft tissue repair or reinforcement in plastic and reconstructive surgery (SIS Plastic Surgery Matrix – K034039 and SIS Facial Implant – K050246). This indication is for the filling of soft tissue defects (such as voids left due to trauma, scarring or tissue removal) and the devices provide minimal, if any, true biomechanical reinforcement other than to increase the tissue volume. The SIS Facial Implant is provided in a three dimensional strand configuration pre-attached to a trocar for ease of use. This is similar to the pre-configured three dimensional semi-lunar shape of the CS for ease of use in the meniscus.

Like the intended use of the DePuy Restore® Orthobiologic Soft Tissue Implant, the TEI Bioscience TissueMend, and the Artimplant Sportmesh, the CS is for general surgical procedures for reinforcement of soft tissue where weakness exists, and is not intended to replace normal body structure. All of these products are intended to provide a resorbable, or degradable, scaffold that is replaced by the patient’s own tissue or is incorporated in the patient’s own tissue. These predicates differ from the CS in that they are additionally indicated for use during rotator cuff surgery, as compared to the CS which is additionally indicated for use during meniscus surgery.

Like the intended use of the Kensey Nash BioBlanket™, the CS is for general surgical procedures for the reinforcement and repair of soft tissue where weakness exists, including general soft tissue defects and hernias. While the CS is additionally indicated for repair of meniscus defects, the Kensey Nash product also has indications of specific use for defects of the thoracic wall, muscle flap reinforcement, rectal and vaginal prolapse, reconstruction of the pelvic floor, suture line reinforcement, and for use during rotator cuff repair surgery.

While there are no predicate surgical mesh devices that have been cleared for use in the meniscus, pre-amendment use of surgical mesh in the intra-articular space of the knee is reported by Parrish.³⁸ He reports on five cases in which Marlex surgical mesh was used intra-articularly in the knee prior to the enactment of the device amendments in May of 1976. These include use in the repair of defects in the medial and lateral femoral condyles as well as in the patella.

While not a predicate, the Bionx Implants device (K012334 and K955768), like the CS, is used for meniscus repair. The device is an absorbable polymeric material that is placed within the intra-articular space of the knee in the same manner as the CS device. These devices are regulated in Class II under 21 CFR 888.3030, *single/multiple component metallic bone fixation*

³⁸ Parrish F, Murray J, Urquhart B. 1978. The Use of Polyethylene Mesh (Marlex®) as an Adjunct in Reconstructive Surgery of the Extremities. *Clinical Orthopaedics and Related Research*. 1978;137: 276-286

appliances and accessories. These meniscus repair devices were found substantially equivalent to metal bone plates and screws, and are more distant from their predicates than any surgical mesh, including the CS, from its respective predicates.

In summary, with respect to intended use of the CS, no new issues of safety or effectiveness are raised in comparison to the predicate products. When focusing on each specific anatomic site or tissue there may be different questions that arise; however, when focusing on any one device's ability to fulfill the surgical mesh intended use to reinforce soft tissue, all of the pertinent types of safety and effectiveness questions are the same. In other words, a surgical mesh in the meniscus is no more distant from its predicate than a surgical mesh indicated for use in an anal fistula, a rotator cuff, or in lung repair. All of these uses are surgical mesh uses and that is what they have in common. FDA must compare the meniscus indication to its predicates in the same manner as the agency compared other new applications of surgical mesh to legally marketed devices. There are precedents for adding specific indications for surgical meshes based on availability of additional data, as evidenced by the indications for the predicate products discussed. In addition, class II devices for meniscus repair have been cleared for use in the meniscus and pre-amendment use of surgical mesh in the intra-articular space of the knee has been documented.

10.4 Principles of Operation and Technological Characteristics



10.5 CS Device's Safety Profile is Comparable to its Predicate Surgical Meshes





Appendix A

Correspondence from Carl DeMarco, Office of Device Evaluation

Data Certification for G920211 Multi-center Clinical Trial







Appendix B

Response to Appeal of





DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

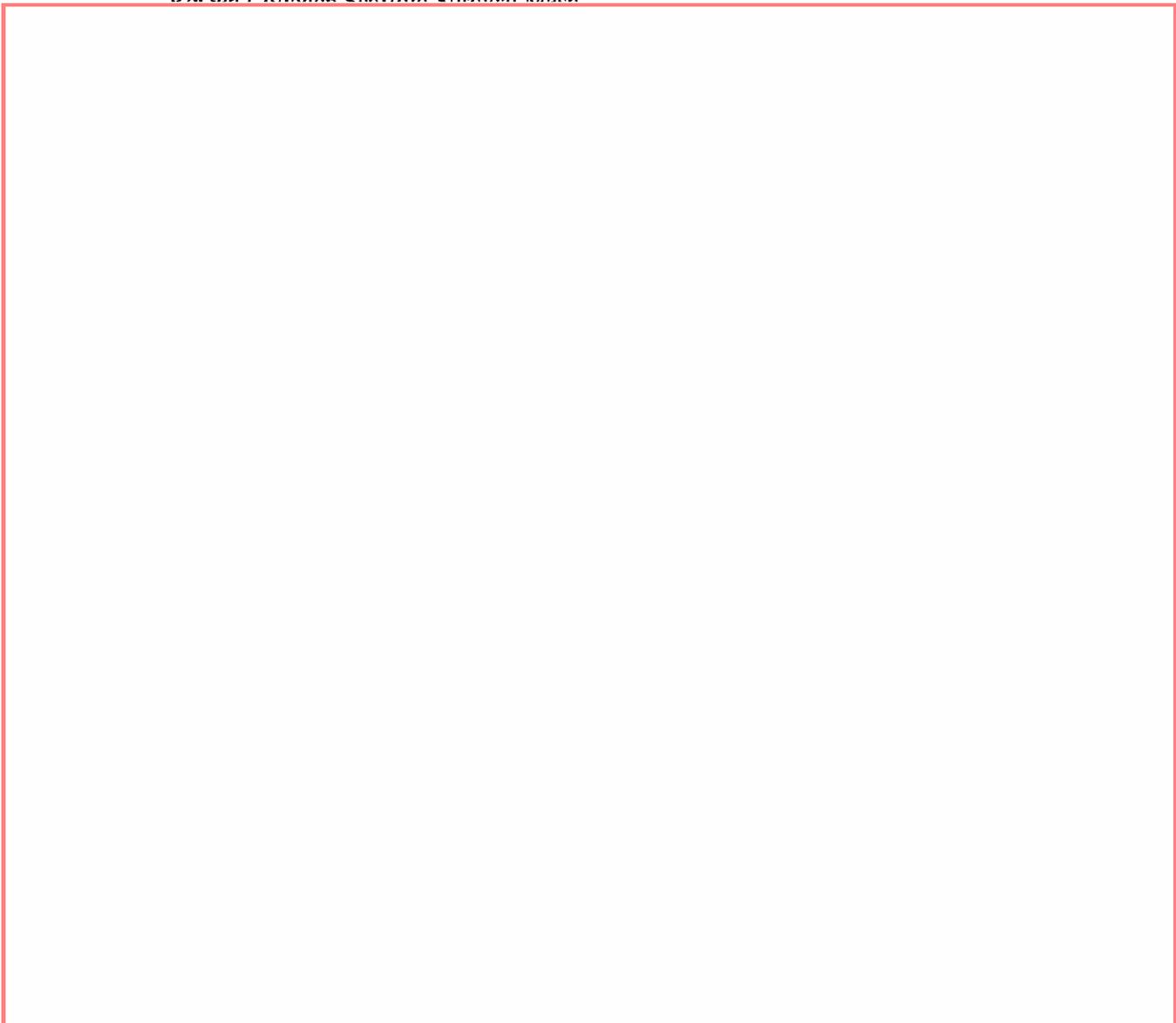
Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20850

Mr. John Dichara
Senior Vice President
ReGen Biologics, Inc.
509 Commerce Street, East Wing
Franklin Lakes, NJ 07417

NOV 03 2006

Re: k053621

ReGen Collagen Scaffold Surgical Mesh





Predicate Resorbable Surgical Meshes (21CFR878.3300) with New Indication(s)

510(K)	INDICATIONS	COMMENTS
K923657 Bio-Vascular Supple Peri-Guard	For repair of hernias and other intra-abdominal soft tissue defect or deficiency	No 510k summary, Purged 510k
K940205 Bio-Vascular Peri-Strips	For surgical stapling of lung tissue, gastric stapling, rectal and vaginal prolapse, urethral sling, reconstruction of the pelvic floor, and hernia or defects of the diaphragm, thoracic and abdominal wall	No 510k summary; Purged 510k
K942911 Glycar Tissue Repair Patch	For repair of hernias and other intra-abdominal soft tissue defect or deficiency	No 510k summary; Purged 510k; Bio-Vascular Peri-Guard device used as predicate
K954665 Glycar Staple Strips	For surgical stapling of lung tissue, gastric stapling, rectal and vaginal prolapse, urethral sling, reconstruction of the pelvic floor, and hernia or defects of the diaphragm, thoracic and abdominal wall	No 510k summary; Purged 510k; Bio-Vascular Peri-Strips device used as predicate
K961440 Fusion Medical RapidSeal Patch	Reinforces soft tissue of the lung thereby sealing or reducing air leaks that occur during pulmonary surgery	Evaluation in 26 patient open-labeled study with endpoint of leak closure. Results showed out of 52 leaks, 96% were successfully closed.
K963226 Boston Scientific Surgical Fabrics (aka Protegen Sling)	Intended to reinforce soft tissue where weakness exists for the urological, gynecological and gastroenterological anatomy inclusive but not limited to the following procedures: pubourethral support, urethral and vaginal prolapse repair, colon and rectal prolapse repair, reconstruction of the pelvic floor, bladder support, and sacro-colposuspension.	Tested and compared to the predicate devices (synthetic meshes and Peri-Guard mesh) Note: Device was removed from the market in 1999 due to high incidence of erosion
K964857 Fusion Medical RapidSeal Patch	Provides a temporary matrix during the natural tissue repair process, resulting in the additional benefit of hemostatic tamponade	Clinical evaluation in 48 patients during "pre-commercial phase." Results were no patch-related complications, and patch was capable of successfully reducing or sealing air leaks intraoperatively. Note: no clinical data to support benefit of tamponade, only animal data.

510(k)	INDICATIONS	COMMENTS
K980483 Mentor Suspend Sling	Intended to reinforce soft tissue where weakness exists in the urological anatomy inclusive of the following procedures: pubourethral support and bladder support, urethral and vaginal prolapse repair, reconstruction of the pelvic floor, and sacro-colposuspension. Intended for the treatment of female urinary incontinence resulting from urethral hypermobility or intrinsic sphincter deficiency.	Comprised of segmented polyether urea urethane elastomer with an anti-bacterial coating. Tested for biocompatibility and suture pull strength. Cited predicates were the GoreTex Tissue Reinforcement Patch and the Protegen Sling.
K983162 Bio-Vascular Peri-Guard and Peri-Strips	For repair of pericardial structures and for use as a prosthesis for the surgical repair of soft tissue deficiencies which include: defects of the abdominal and thoracic wall, gastric banding, muscle flap reinforcement, rectal and vaginal prolapse, reconstruction of the pelvic floor, and hernias (including diaphragmatic, femoral, incisional, inguinal, lumbar, paracolostomy, scrotal, and umbilical hernias). For use as a prosthesis for the surgical repair of soft tissue deficiencies using surgical staplers. To reinforce staple lines during lung resections including pneumonectomy, pneumoreduction, pneumectomy, lobectomies, segmentectomies (segmental resections), wedge resection, bullectomies, blebectomies, bronchial resections, and other lung incisions and excisions of lung and bronchus.	No performance data cited other than cross-linked treatment with 1M NaOH
K001738 DePuy Restore	For use in general surgical procedures for reinforcement of soft tissue where weakness exists. The device is intended to act as a resorbable scaffold that initially has sufficient strength to assist with a soft tissue repair, but then resorbs and is replaced by the patient's own tissue. In addition, the implant is intended for use in the specific application of reinforcement of the soft tissues which repaired by suture or suture anchors limited to the suprapiratus during rotator cuff repair surgery.	Feasibility study 5 patients followed for 3 months, with several surgeon letters of support (from purged 510k)
K021160 Carbon Medical Technologies Dermatrix	intended for use in the treatment of hernias where the connective tissue has ruptured or for implantation to reinforce soft tissues where weakness exists in the urological, gynecological and gastroenterological anatomy. This includes but is not limited to the following procedures: pubourethral support including urethral slings, urethral and vaginal prolapse repair, colon and rectal prolapse repair, reconstruction of the pelvic floor, bladder support, tissue repair, and sacro-colposuspension.	510k Summary cites bench testing and "numerous clinical experiences"
K024199 OsteoBiologics IMMIX Thin Film	For use wherever temporary wound support is required, to reinforce soft tissue where weakness exists, or for the repair of hernia or other fascial defects that require the addition of a reinforcing, or bridging material to obtain the desired surgical result. This includes, but is not limited to the following procedures: vaginal prolapse repair, colon and rectal prolapse repair, reconstruction of the pelvic floor and sacral colposuspension.	Bench tested cited to "support its suitability for use in a clinical situation"

510(k)	INDICATIONS	COMMENTS
K031969 DePuy Restore	For use in general surgical procedures for reinforcement of soft tissue where weakness exists. In addition, the implant is intended for use in the specific application of reinforcement of the soft tissues, which are repaired by suture or suture anchors, during rotator cuff repair surgery. The Restore Implant is not intended to replace normal body structure or provide the full mechanical strength to repair the rotator cuff. Sutures to repair the tear and sutures or bone anchors to reattach the tissue to the bone provide mechanical strength for the rotator cuff repair. The Restore Implant reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue.	Clinical data "replaced by the patient's own tissue"
K030782 Gore Seamguard Staple Line Reinforcement	For surgical procedures in which soft tissue transection or resection with staple line reinforcement is needed. Can be used for reinforcement of staple lines during lung resection and for reinforcement of gastric staple lines during bariatric surgical procedures of gastric bypass and gastric banding.	Device "integrity testing" performed
K03337 Ethicon UltraPro Mesh	For the repair of hernias and other abdominal fascial deficiencies that require the addition of a reinforcing or bridging material to obtain the desired surgical result.	510k summary states: "comparison to other commercialized surgical meshes indicates equivalency in clinical performance." "Additionally, animal testing demonstrated that UltraPro would achieve good tissue ingrowth."
K040364 Porex Surgical Medpore Surgical Implant	For non-weight bearing applications of craniofacial reconstruction/cosmetic surgery and repair of craniofacial trauma	No testing cited
K042809 Organogenesis CuffPatch	For reinforcement of soft tissues repaired by sutures or suture anchors, during tendon repair surgery including reinforcement of rotator cuff, patella, Achilles, biceps, quadriceps or other tendons. Not intended to replace normal body structure or provide the full mechanical strength to support tendon repair of the rotator cuff rotator cuff, patella, Achilles, biceps, quadriceps or other tendons. Sutures, used to repair the tear, and sutures or bone anchors, used to attach the tissue to the bone, provide biomechanical strength for the tendon repair. CuffPatch surgical mesh reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue.	510k summary states bench testing indicates suitability for its intended clinical applications
K043259 Kensey Nash BioBlanket	For use in general surgical procedures for the reinforcement and repair of soft tissue where weakness exists including, but not limited to defects of the thoracic wall, muscle flap reinforcement, rectal and vaginal prolapse, reconstruction of the pelvic floor, hernias, suture line reinforcement and reconstructive procedures. The device is also intended for reinforcement of the soft tissue which are repaired by suture or suture anchors, limited to the supraspinatus, during rotator cuff repair surgery.	510k summary cites biocompatibility, integrity, in vitro and in vivo performance testing

510(k)	INDICATIONS	COMMENTS
K043388 Pegasus Biologics OrthoAdapt Surgical Mesh	For implantation to reinforce soft tissue including but not limited to: defects of the abdominal and thoracic wall, muscle flap reinforcement, rectal and vaginal prolapse, reconstruction of the pelvic floor, hernias, suture-line reinforcement, and reconstructive procedures. The device is also intended for the reinforcement of soft tissues repaired by sutures or suture anchors during tendon repair surgery including reinforcement of rotator cuff, patella, Achilles, biceps, quadriceps, or other tendons. OrthoAdapt is not intended to replace normal body structure or provide the full mechanical strength to support tendon repair of the rotator cuff, patella, Achilles, biceps, quadriceps or other tendons. Suture, used to repair the tear, and sutures or bone anchors, used to attach the tissue to the bone, provide biomechanical strength for the tendon repair.	No 510k summary -- statement only
K050337 Cook Biotech SIS Fistula Plug	For implantation to reinforce soft tissue where a rolled configuration is required, for repair of anal, rectal, and enterocutaneous fistulas.	Clinical experience in ~25 patients with approximately 3 months follow-up to show fistula closure.
K050445 AMS Collagen Dermal Matrix	For use in the treatment of hernias where the connective tissue has ruptured or for implantation to reinforce soft tissues where weakness exists in the urological, gynecological and gastroenterological anatomy. This includes but is not limited to the following procedures: pubourethral support including urethral slings, urethral and vaginal prolapse repair, colon and rectal prolapse repair, reconstruction of the pelvic floor, bladder support, tissue repair, sacral colposuspension and reinforcement in the repair of Peyronie's disease . By providing pubourethral support, the AMS collagen dermal matrix may be used for the treatment of urinary incontinence resulting from urethral hypermobility or intrinsic sphincter deficiency.	510k summary cites bench testing
K051701 Ethicon Vicryl Mesh Bag	For use wherever temporary wound or solid organ support is required (kidney, liver, spleen)	No testing cited in 510k summary; Vicryl mesh used as predicate
K061892 Cryolife ProPatch Soft Tissue Repair Matrix	For implantation to reinforce soft tissues where weakness exists, including but not limited to: defects of the abdominal and thoracic wall, muscle flap reinforcement, rectal and vaginal prolapse, reconstruction of the pelvic floor, hernias, suture-line reinforcement, and reconstructive procedures. The device is also intended for the reinforcement of soft tissues repaired by sutures or suture anchors during tendon repair surgery including reinforcement of rotator cuff, patella, Achilles, biceps, quadriceps, or other tendons. Device is not intended to replace normal body structure or provide the full mechanical strength to support tendon repair of the rotator cuff, patellar, Achilles, biceps, quadriceps or other tendons. Suture, used to repair the tear, and sutures or bone anchors, used to attach the tissue to the bone, provide biomechanical strength for the tendon repair. The device reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue.	510k cites bench testing performed

Appendix D

Substantial Equivalence Table

K Number	Collagen Scaffold (CS) ReGen Biologics	Restore [®] Orthobiologic Soft Tissue Implant DePuy, Inc.	BioBlanket Surgical Mesh Xensy Nash Corp	SIS Fistula Plug Cook Biotech Inc	TissueMend, OrthoMend TEI Biosciences	Surgisis Cook Biotech Inc	Permacol, ZGR Tissue Science Laboratories	Optimesh Spineology, Inc.	CuffPatch Organogenesis	Sportmesh Artimplant AB	Marlex Mesh Davol
	K053621	K031959 K001738 K082330	K043289 K041923	K050377	K031188 K051786	K974540 K986431 K992159 K022044 K034039 K050246	K922566 K013625 K021056 K043366 K089255	K014200	K042809	K052830	Pre-Amendment
Class		Class II	Class II	Class II	Class II	Class II	Class II	Class II	Class II	Class II	NA
Regulation		Surgical Mesh	Surgical Mesh	Surgical Mesh	Surgical Mesh	Surgical Mesh	Surgical Mesh	Mesh, Metal	Surgical Mesh	Surgical Mesh	Surgical Mesh
Product Code		FTM	FTM	FTL	FTL	FTM, FTL	FTM, FTL	EZX	FTM	FTM	NA
		For use in general surgical procedures for reinforcement of soft tissue where weakness exists. In addition, is intended for use in specific application of reinforcement of soft tissue issues which are repaired by suture or suture anchors, during rotator cuff repair surgery. Reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue. Not intended to replace normal body structure or provide the full mechanical strength to repair rotator cuff.	For use in general surgical procedures for reinforcement of soft tissue where weakness exists, including but not limited to, defects of the thoracic wall, muscle flap reinforcement, rectal and vaginal prolapse reconstruction of the pelvic floor, hernias, suture line reinforcement	For implantation to reinforce soft tissue where a rolled configuration is required, for repair of anal, rectal and enterocutaneous fistulas.	For surgical implantation to reinforce soft tissue where weakness exists and for the repair of damaged or ruptured soft tissue membranes. Intended to reinforce soft tissues that are repaired by suture or suture anchors during tendon repair surgery, including reinforcement of the rotator cuff, patella, Achilles, biceps, quadriceps, or other tendons.	For implantation to reinforce soft tissue where weakness exists in patients requiring soft tissue repair or reinforcement. Indications include plastic and reconstructive surgery (including the face and head), repair of a hernia or body wall defect. Includes use in the urological, gastroenterological, and gynecological anatomy, including but not limited to the following procedures: pubourethral support, urethral and vaginal	For use as a soft tissue patch to reinforce soft tissue where weakness exists and for the surgical repair of damaged or ruptured soft tissue membranes. Specifically indicated for repair of abdominal, inguinal, diaphragmatic, femoral, scrotal, umbilical, parastomal and incisional hernias; colon, rectal, urethral and vaginal prolapse; muscle flap reinforcement; reconstruction of the pelvic floor, and procedures such as	Intended to maintain the relative position of bone graft material (such as autograft or allograft) within a vertebral body defect (eg tumor) that does not impact the stability of the vertebral body and does not include the vertebral endplates.	For reinforcement of soft tissues repaired by sutures or suture anchors, during tendon repair surgery, including rotator cuff, patella, Achilles, biceps, quadriceps, and other tendons. Sutures used to repair the tear and sutures or bone anchors are used to attach the tissue to the bone provide biomechanical strength for the tendon repair. Reinforces soft	For use in general surgical procedures for reinforcement of soft tissue where weakness exists. Also intended for soft tissues that are repaired by suture or suture anchors, limited to the supraspinatus, during rotator cuff repair surgery. Not intended to replace normal body structure or provide the full mechanical strength to	For use in the intra-articular space of the knee, including use in the repair of defects in the medial and lateral femoral condyles as well as the patella

	<p>des to repair the and sutures or e anchors to ach the tissue to bone provide hanical strength rotator cuff repair. nforces soft ue and provides ortable ifold that is laced by the lent's own soft ue.</p>	<p>and reconstructive procedures. Also intended for reinforcement of soft tissues which are repaired by suture or suture anchors, limited to the supraspinatus, during rotator cuff repair surgery.</p>	<p>Not intended to replace normal body structure or provide the full mechanical strength to support tendon repair of the rotator cuff, patellar, Achilles, biceps, quadriceps, or other tendons. Sutures used to repair the tear and sutures or bone anchors used to attach the tissue to the bone provide biomechanical strength for the tendon repair. Reinforces soft tissue and provides a resorbable scaffold that is replaced by the patient's own tissues.</p>	<p>Protease repair, colon and rectal prolapse repair, reconstruction of the pelvic floor, bladder support, tissue repair, and sacrocolp- suspension. By providing urethral support, may be used for the treatment of urinary incontinence resulting from urethral hypermobility or intrinsic sphincter deficiency. Also includes use as a staple line reinforcement during various surgical procedures, including lung resection and gastric bypass.</p>	<p>sacrocolp- suspension and urethral sling. Indications also include soft tissue repair or reinforcement in plastic and reconstructive surgery of the face and head, and reinforcement of the soft tissues which are repaired by sutures or suture anchors, limited to the supraspinatus during rotator cuff repair surgery.</p>	<p>tissue and provides a resorbable scaffold that is replaced by the patient's own soft tissue.</p>	<p>support the rotator cuff. Sutures used to repair the tear and sutures or bone anchors used to attach the tissue to the bone provide mechanical strength for the tendon repair. Reinforces soft tissue and provides a resorbable scaffold that is incorporated in the patient's own tissue.</p>	<p>Polypropylene mesh</p>
Materials	<p>Porcine small intestine submucosa (SIS) comprised predominantly of collagen with small amounts of glycosaminoglycans</p>	<p>Single layer porous, cross-linked collagen</p>	<p>Porcine small intestine submucosa (SIS) comprised predominantly of water and types I and III collagen with small amounts of glycosaminoglycans</p>	<p>Acellular crosslinked porcine dermal collagen</p>	<p>Polyethylene Terephthalate (PET)</p>	<p>Laminated sheets of acellular porcine-derived collagen from the intestine</p>	<p>Arlelon fiber knit mesh (poly urethane urea)</p>	<p>Polypropylene mesh</p>

	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Degrades; 50% resorption in 6 years	No
Bioabsorbable													
Form	Sheet/Pad	Pre-formed shape of tapered solid cylinder	Sheet	Sheets of various sizes; pre-shaped forms depending on application	Sheets of various sizes; pre-shaped forms depending on application	Sheets of various sizes; pre-shaped forms depending on application	Sheets of various sizes; pre-shaped forms depending on application	Three dimensional pouch	Sheets of various sizes	Sheet	Sheet	Sheet	Sheet
Size	5x5cm to 5x10cm 1.0x0.25mm thickness	1 to 7 mm in diameter, 10cm in length	Not Specified	Up to 20x20cm and 1 mm thickness	Not Specified	Not Specified	Not Specified	~0.3mm thickness	Not Specified	Not Specified			
Suture pullout strength	.69x0.80lb	11.21x4.13lb	7.79x0.81lb	0.85 to 5.74lb	0.85 to 5.74lb	0.85 to 5.74lb	0.85 to 5.74lb	Not Specified	Not Specified	Not Specified	>30N	Not Specified	Not Specified
Customized Use	SAME	SAME	SAME	SAME	SAME	SAME	SAME	Deployable for minimally invasive implantation in vertebral body	SAME	SAME	SAME	SAME	SAME

Appendix E

Technical Report: Characterization o



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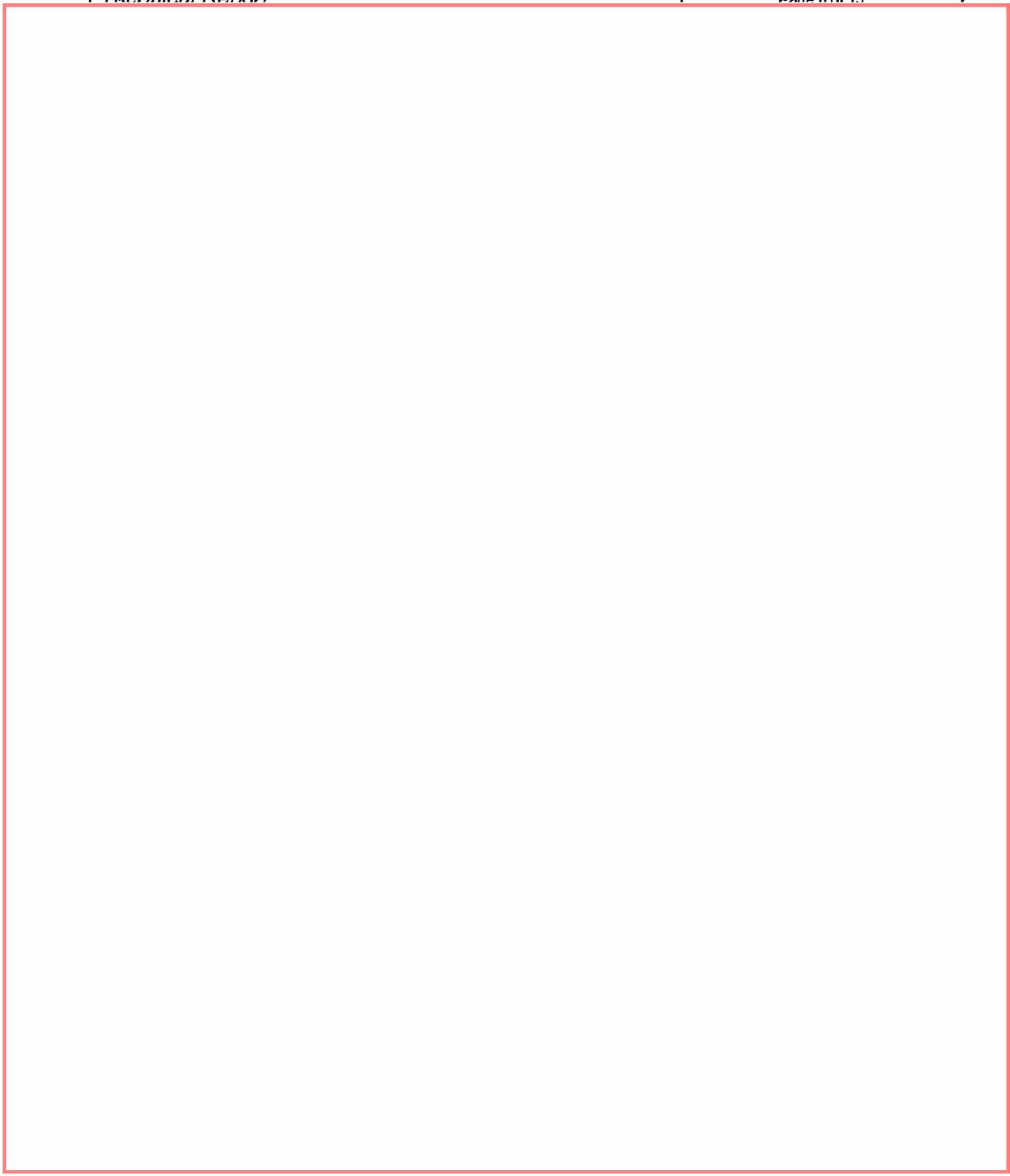
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Appendix F

Letters of Access to Device Master Files

[REDACTED]

August 30, 2004

Mr. Douglas J. Ford
Q.A. Manager
ReGen Biologics, Inc.
545 Penobscot Drive
Redwood City, CA 94063
U. S. A.

Re: Device Master File - [REDACTED]

Dear Mr. Ford,

[REDACTED] hereby authorizes the Food and Drug Administration to
include by reference information in [REDACTED]

[REDACTED] in support of [REDACTED]
concerning its Collagen Meniscus product. [REDACTED]

Sincerely yours,

[REDACTED]



Appendix G

Technical Report: Stability Data Analysis



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CMI Stability Data Analysis





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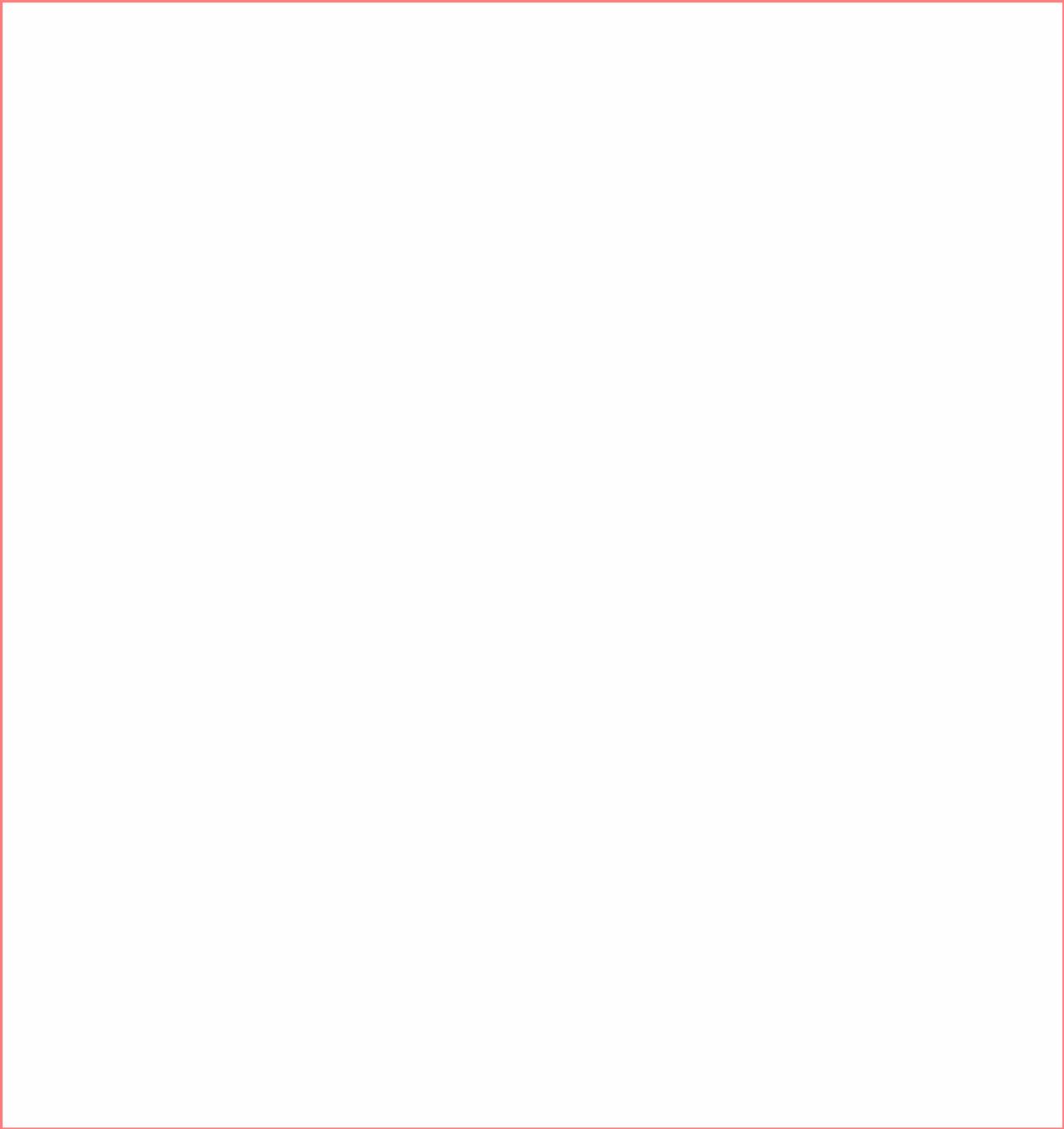
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