April 30, 2021

Biorez, Inc.
% Robert Poggie, Ph.D.
President
BioVera, Inc.
65 Promenade Saint Louis
Notre Dame de L'lle Perrot, Quebec J7V7P2
Canada

Re: K203267
Trade/Device Name: The BioBrace™ Implant
Regulation Number: 21 CFR 878.3300
Regulation Name: Surgical Mesh
Regulatory Class: Class II
Product Code: OWW, OWY
Dated: March 24, 2021
Received: March 29, 2021

Dear Dr. Poggie:

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. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

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

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's

requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

for

Laura C. Rose, Ph.D.
Assistant Director
DHT6C: Division of Restorative, Repair
and Trauma Devices
OHT6: Office of Orthopedic Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2023
See PRA Statement below.

510(k) Number *(if known)*
K203267

Device Name

The BioBrace™ Implant

Indications for Use *(Describe)*

The BioBrace™ Implant is intended for use in general surgical procedures for reinforcement of soft tissue where weakness exists. The BioBrace™ Implant is also intended for reinforcement of soft tissues that are repaired by suture or suture anchors, during tendon repair surgery including reinforcement of rotator cuff, patellar, Achilles, biceps, or quadriceps tendons. The BioBrace™ Implant is not intended to replace normal body structures or provide the full mechanical strength to support the rotator cuff, patellar, Achilles, biceps, or quadriceps tendons. Sutures used to repair the tear, and sutures or bone anchors used to attach the tissue to bone, provide mechanical strength for the tendon repair.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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510(k) Summary for the BioBrace™ Implant

In accordance with 21 CFR 807.92 of the Federal Code of Regulations, the following information is a summary of safety and effectiveness of the BioBrace™ Implant.

A. SUBMITTERS INFORMATION

Submitter Name:	BioVera, Inc.
Submitter Address:	65 Promenade Saint-Louis, Notre-Dame-de-L'Ile-Perrot, Quebec, J7V 7P2, CANADA
Contact Person:	Robert A. Poggie, PhD
Phone & Fax Numbers:	514-901-0796
Date of Submission:	March 24, 2021

B. DEVICE IDENTIFICATION & MANUFACTURER

Manufacturer Name:	Biorez, Inc.
Manufacturer Address:	470 James Street, Suite 14, New Haven, CT, 06513 USA
Registration Number:	TBD
Contact Name:	Kevin Rocco
Title:	CEO
Device Trade Name:	The BioBrace™ Implant
Device Common Name:	Surgical mesh; soft tissue augmentation implant
Classification Name:	mesh, surgical, absorbable, orthopaedics, reinforcement of tendon
Classification Code:	OWW and OWY
Classification Panel:	General and Plastic Surgery Devices
Regulation Number:	21 CFR sections 878.3300

C1. PRIMARY PREDICATE DEVICE

K121216	Soft Tissue Regeneration's STR GRAFT

C2. REFERENCE DEVICES

K112423	Rotation Medical's Collagen Tendon Sheet
K071887	Artelon Tissue Reinforcement
K192112	International Life Sciences FlexBand, FlexPatch, FlexBand Plus
K032245	Arthrex Fiber Tape Family (Internal Brace)

D. DEVICE DESCRIPTION

The BioBrace™ implant is a bioresorbable, biocomposite scaffold composed of a highly-porous collagen sponge made from insoluble bovine tendon type-1 collagen, and reinforced with poly-L-lactic-acid (PLLA) multifilament yarn (75 denier, 15 μm filament diameter). The BioBrace implant is 80% porous, average density of 0.2 grams/cm^3, and median pore diameter of 19 μm. The highly-porous collagen sponge comprises the majority of implant surface area (0.7 m^2/gram) versus the PLLA filaments alone (0.2 m^2/gram), creating a large biologic matrix for cellular ingrowth. BioBrace implants are approximately 3 mm thick, provided in two rectangular sizes of 5 x 250mm and 23 x 30mm, and are designed for soft tissue and tendon augmentation and reinforcement. The BioBrace implant is single-use and supplied sterile with SAL of 10^{-6}.

E. INDICATIONS FOR USE

The BioBrace™ Implant is intended for use in general surgical procedures for reinforcement of soft tissue where weakness exists. The BioBrace™ Implant is also intended for reinforcement of soft tissues that are repaired by suture or suture anchors, during tendon repair surgery including reinforcement of rotator cuff, patellar, Achilles, biceps, or quadriceps tendons. The BioBrace™ Implant is not intended to replace normal body structures or provide the full mechanical strength to support the rotator cuff, patellar, Achilles, biceps, or quadriceps tendons. Sutures used to repair the tear, and sutures or bone anchors used to attach the tissue to bone, provide mechanical strength for the tendon repair.

F. TECHNOLOGICAL CHARACTERISTICS AND COMPARISON TO PREDICATE DEVICE

The BioBrace™ implant is composed of 75 denier PLLA microfilament yarn that bioresorbs by hydrolysis, and insoluble Type-1 bovine collagen in the form of a microporous sponge that biodegrades via collagenases and in turn bioresorbs. The BioBrace implant is 80% porous with median pore size of 19 μm. The predicate STR GRAFT is approximately 50% porous with median pore size of 20 μm and entirely composed of PLLA. The subject BioBrace implant and predicate STR GRAFT devices are manufactured with the same 75 denier PLLA multifilament yarn that provides tensile strength at time zero and through the period of infiltration and healing by soft tissue. The subject and predicate devices are both designed to augment the strength of injured or deficient soft tissue and bioresorb over time, facilitating the transition in load bearing from the tissue plus device to the host tissue alone.

The subject BioBrace implant and reference device Collagen Tendon Sheet possess porous collagen matrices that absorb fluid on contact, facilitate the healing of injured soft tissues, biodegrade through the action of collagenase, and bioresorb over time. Physical characteristics of the BioBrace implant were measured and compared to commercially available Regeneten (Rotation Medical's Collagen Tendon Sheet) and Arthrex FiberTape (Internal Brace) devices. The BioBrace device's porosity was 80%, pore volume was 4.2 cm^3/gram, internal pore surface area was 0.7 m^2/gram, and permeability was 1520 mD. The porosity, pore volume, internal pore surface area, and permeability of the BioBrace implant was significantly higher than the Regeneten and FiberTape devices.

Fluid uptake of BioBrace implant was greater than 300% as measured gravimetrically, per ASTM F-2212, which was significantly higher than FiberTape.

In summary, comparison of the characteristics of the predicate, reference, and BioBrace devices demonstrated the following:

- Commonality in materials used to manufacture,
- Commonality and cross over in size options,
- Equivalence in strength of repair and cellular reaction of the primary predicate and subject devices per an ovine model of rotator cuff repair at 6 and 12 weeks,
- Biocompatibility per ISO 10993-1, and
- Maintenance of mechanical integrity of the primary predicate and subject devices through healing per in vitro testing at 37 C in PBS.

G. PERFORMANCE DATA

The characterization of the physical, biomechanical, and biocompatibility properties of the BioBrace Implant were based on the FDA guidance documents for “Preparation of a Premarket Notification Application for a Surgical Mesh” and “Use of International Standard ISO 10993-1, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process", and 510(k) pre-submission Q190638.

The subject and predicate devices were evaluated in vitro for mechanical properties at time zero and after degradation in PBS at 37 C, and in ovine studies of rotator cuff repair in sheep with follow up of 6- and 12-weeks. The data from the ovine studies showed the increase in strength of soft tissue repair was statistically significant from 6 to 12 weeks, with equivalent strength at 6 weeks, and again at 12 weeks for the subject and predicate devices. The in vivo data demonstrated equivalent cellular response for the subject and predicate devices per ISO 10993-6. Further detailed descriptions of these studies follow below.

Characterization of physical, mechanical, and materials properties of BioBrace devices were measured at t=0 and after in vitro degradation (37C saline) for 6wks, 12wks, and 26wks. Mechanical properties measures included ultimate tensile strength, tear resistance strength, suture pull-through strength, and ball burst strength per ASTM standards D882-10, D226, and D3787, with PLLA polymer fiber properties measured per ASTM D2857 and D3418, and collagen, fluid uptake, and absorbance properties per ASTM F2212.

Evaluation of BioBrace augmented doubled-over ovine extensor tendon in a Sawbones (20 pcf) in vitro model demonstrated a statistically significant increase in pull-out strength and stiffness ($P<0.05$), relative to doubled-over ovine extensor tendon alone. The pull-out strength with and without BioBrace augments was 656 ± 87 and 457 ± 70 N, respectively, and stiffness was 175 ± 22 and 124 ± 29 N/mm, respectively.

Biocompatibility assessment was performed in three steps, with the first step being chemical characterization followed by toxicological risk assessment (TRA, second step) to inform the biological evaluation plan (ISO 10993 tests, third step). Chemical characterization testing was performed per ISO 10993-18, with extractions performed in accordance with ISO 10993-12. Organic extractables were evaluated by LC-UV-MS and GC-MS. All organic extractables in concentrations above the calculated analytical evaluation threshold (AET) were evaluated in

the TRA per ISO 10993-17:2002. The TRA concluded that none of the extractables or leachables identified in BioBrace implants posed a toxicological risk. Subsequent to the TRA, BioBrace devices were evaluated per ISO 10993-1 (third step) per 10993-5 (Cytotoxicity), 10993-6 (Local Implantation Effects), 10993-10 (Irritation or Intracutaneous Reactivity), 10993-10 (Sensitization), 10993-11 (Acute Systemic Toxicity), and 10993-11 (Material Mediated Pyrogenicity). The results showed no adverse biological response; the BioBrace device was determined to be biocompatible per chemistry, TRA, and ISO 10993 assessments.

In vivo biologic response of the BioBrace implant was characterized in an established ovine infraspinatus tendon model based on macroscopic observations, radiographic (X-ray and micro-computed tomography) and histological analyses at 6- and 12-weeks post implantation. Macroscopic observations revealed no evidence of adverse reactions at any implant site, indicating normal healing response for all sheep and time points. Radiograph and micro-computed tomography showed no adverse reactions at the infraspinatus surgical sites for all test groups and time points. The ultimate tensile strength of the BioBrace repaired tendon construct increased (p=.01) between time-0 and 6-weeks (1163 ± 303N and 1740 ± 338N) and 6- and 12-weeks (p=0.01) (1740 ± 338N versus 2463 ± 484N). There was no significant difference in UTS (p=0.35) between BioBrace repaired tendons and contralateral native control tendons at 12-weeks (2463 ± 484N versus 2707 ± 605N). PMMA and paraffin-embedded histology indicated a normal host healing response at both time points with progressive new tissue formation and integration over time. Neovascularization and new tissue formation in direct apposition and throughout the BioBrace implant was noted at 6 weeks and progressed through 12 weeks. Fibroblast activity and new blood vessels accompanied the new tissue formation present at the host/ implant interface, as well as within the porous implant structure. The local tissue response included low numbers of macrophages and multinucleated giant cells with scattered lymphocytes. This in vivo study in an ovine infraspinatus model confirmed that BioBrace elicited a normal healing response and supported cellular ingrowth and new tissue formation. Similar to the results of the ovine study with BioBrace device, the collagen scaffold (Collagen Tendon Sheet) studied by Van Kampen et.al. (Van Kampen et al. 2013) and BioBrace devices exhibited the formation of a layer of dense oriented collagenous tissue that increased the thickness of the tendon.

Side by side evaluation and comparison of the methods, ambulation, imaging, histology, tissue reactions and mechanical properties of the subject BioBrace and predicate devices at 6- and 12-weeks indicated qualitative, quantitative, and statistical equivalence. More specifically using ISO10993-6 evaluation criteria, tissue reaction to subject and predicate devices was categorized as “minimal to no reaction”. Evaluation and comparison of histology and mechanical properties indicated strengthening and healing from 6- to 12-weeks, and statistical equivalence of the strength of the reconstructions for subject and predicate devices.

Validation of sterilization of BioBrace devices with ethylene oxide was performed in accordance with ISO 14937:2009 using the half dose (half lethality) method per TIR56 Annex B. Sterilization was validated to 10^{-6} SAL. Validation of sterilization included demonstration that sterilized BioBrace devices meet maximum EO residual limits per ISO 10993-7:2008.

Limulus Amebocyte Lysate (LAL) testing demonstrated the BioBrace to meet acceptance criteria of less than 20 for endotoxin units per surgical site, or 10 endotoxin units per device.

Packaging was successfully validated per ASTM consensus standards D4332 (-30C for 72 hours, 40C for 72 hours), shipping and handling simulation per D4169-16, and tested for package seal integrity (per ASTM F1886, F2096, and F88).

In summary, the performance data presented in this 510(k) notification demonstrate that BioBrace implants:

- are composed of biocompatible resorbable materials,
- are easily manipulated in surgery for open or arthroscopic soft tissue repair surgeries,
- possess high fluid absorbency potential > 300% by weight,
- maintain mechanical integrity through the healing per in vitro testing at 37 C in PBS,
- are biocompatible per the chemical characterization via ISO 10993-18, toxicological risk assessment, and 10993-1 test results,
- demonstrate rapid tissue and cellular infiltration (6-weeks) per an ovine model of rotator cuff repair,
- exhibited low to no adverse tissue / cellular inflammation per ISO 10993-6 scoring, and
- statistically similar strength of tendon repair as the contralateral control tendon at 12 weeks (2463 ± 484N versus 2707 ± 605N).

H. CONCLUSIONS

The BioBrace implant has similar indications for use, technological characteristics, and principles of operation as the primary predicate and reference devices. The technological differences between the subject, predicate, and reference devices do not raise new issues of safety or effectiveness. The in vitro and in vivo performance data demonstrate that the BioBrace implant is substantially equivalent to the predicate device.