4/2/2021

Collagen Matrix, Inc.
Gloria Zuclich
Director, Regulatory Affairs
15 Thornton Road
Oakland, New Jersey 07436

Re: K202183
Trade/Device Name: Porcine Mineral Collagen Composite
Regulation Number: 21 CFR 872.3930
Regulation Name: Bone Grafting Material
Regulatory Class: Class II
Product Code: NPM
Dated: February 28, 2021
Received: March 2, 2021

Dear Gloria Zuclich:

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,

Sherrill Lathrop Blitzer

for Andrew Steen
Assistant Director
DHT1B: Division of Dental Devices
OHT1: Office of Ophthalmic, Anesthesia, Respiratory, ENT and Dental 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: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*

K202183

Device Name

Porcine Mineral Collagen Composite

Indications for Use *(Describe)*

Porcine Mineral Collagen Composite is indicated for:

- Augmentation or reconstructive treatment of alveolar ridge
- Filling of infrabony periodontal defects
- Filling of defects after root resection, apicoectomy, and cystectomy
- Filling of extraction sockets to enhance preservation of the alveolar ridge
- Elevation of maxillary sinus floor
- Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR)
- Filling of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR).

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.

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510(k) SUMMARY

1. Applicant Information

Applicant Name: Collagen Matrix, Inc.
Address: 15 Thornton Road
Oakland, New Jersey 07436

Telephone: (201) 405-1477
Fax: (201) 405-1355

Contact Person: Gloria Zuclich
Director of Regulatory Affairs
gzuclich@collagenmatrix.com

Date Prepared: April 2, 2021

2. Name of the Device

Device Trade Name: Porcine Mineral Collagen Composite

Device Common Name(s): Bone Grafting Material

Device Classification Name: Bone Grafting Material, Animal Source
872.3930
NPM
Class II

3. Legally Marketed Devices to Which Substantial Equivalence is Claimed

Primary Predicate Device: Bio-Oss® Collagen
Geistlich-Pharma AG
K033815

Reference Device(s): Anorganic Bone Mineral with Collagen in Delivery Applicator
Collagen Matrix, Inc.
K171008

Collagen Dental Membrane – Porcine Type I Collagen
Collagen Matrix, Inc.
K110600

Collagen Dental Wound Dressings
Collagen Matrix, Inc.
K122115

4. Description of the Device

Porcine Mineral Collagen Composite is an osteoconductive bone mineral with collagen composite for bone grafting in periodontal, oral and maxillofacial surgery. The device is composed of anorganic bone mineral granules derived from porcine cancellous bone and collagen from porcine Achilles tendon in compressed, formaldehyde-crosslinked, preformed sponge matrices designed to fit the size of the defect upon hydration. The product is supplied sterile, non-pyrogenic and for single use only.

The product is available in the following shape and sizes:

Product Shape	Dimensions
Plug	10mm (5mm dry) x 17mm (diameter x length)
Umbrella	17mm (13mm dry) x 10mm (diameter x height)
Umbrella	22mm (17mm dry) x 12mm (diameter x height)

5. Intended Use

Porcine Mineral Collagen Composite is intended to be used for bone grafting in periodontal, oral and maxillofacial surgeries.

Porcine Mineral Collagen Composite is indicated for:

- Augmentation or reconstructive treatment of alveolar ridge
- Filling of infrabony periodontal defects
- Filling of defects after root resection, apicoectomy, and cystectomy
- Filling of extraction sockets to enhance preservation of the alveolar ridge
- Elevation of maxillary sinus floor
- Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR)
- Filling of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR).

6. Summary/Comparison of Technical Characteristics

The subject device and the predicate device have the same indications for use.

The subject device has substantially equivalent technological characteristics as the cited legally marketed predicate device. Differences include the physical form, product size range and/or product weight range. Differences in the physical form and product size range have been determined to be minor and are substantiated when compared to that of the cited reference device. The difference in product weight range offered for the subject device falls within the range supplied for the primary predicate device.

Feature	Porcine Mineral Collagen Composite (This Submission)	Bio-Oss® Collagen (K033815)	Anorganic Bone Mineral with Collagen in Delivery Applicator (K171008)
Indications for Use	• Augmentation or reconstructive treatment of alveolar ridge • Filling of infrabony periodontal defects • Filling of defects after root resection, apicoectomy, and cystectomy • Filling of extraction sockets to enhance preservation of the alveolar ridge • Elevation of maxillary sinus floor • Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR) • Filling of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR)	• Augmentation or reconstructive treatment of alveolar ridge • Filling of periodontal defects • Filling of defects after root resection, apicoectomy, and cystectomy • Filling of extraction sockets to enhance preservation of the alveolar ridge • Elevation of maxillary sinus floor • Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR) • Filling of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR)	• Augmentation or reconstructive treatment of alveolar ridge • Filling of infrabony periodontal defects • Filing of defects after root resection, apicoectomy, and cystectomy • Filing of extraction sockets to enhance preservation of the alveolar ridge • Elevation of maxillary sinus floor • Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR). • Filing of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR)
Physical Form	Preformed sponge matrix	Block Shaped	Preformed sponge matrix
Color	White to off-white	White to off-white	White to off-white
Material Composition	• Anorganic bone mineral (calcium phosphate) • Type I collagen	• Anorganic bone mineral (calcium phosphate) Type I collagen	• Anorganic bone mineral (calcium phosphate) • Type I collagen
Size (Dimension)	10mm x 17mm 17mm x 10mm 22mm x 12mm	N/A	4.8mm x 12.5mm 4.8mm x 25.0mm 4.8mm x 37.5mm
Weight	80mg 175mg 350mg	50mg 100mg 250mg 500mg	N/A
Cross-linking	Crosslinked with formaldehyde	Unknown	Crosslinked with formaldehyde
Biocompatibility	Biocompatible ISO 10993	Biocompatible ISO 10993	Biocompatible ISO 10993
Sterility	Sterile, SAL 10^{-6} Gamma irradiation ISO 11137	Sterile, SAL 10^{-6} Gamma irradiation	Sterile, SAL 10^{-6} Gamma irradiation ISO 11137

Pyrogenicity	Non-pyrogenic	Non-pyrogenic	Non-pyrogenic
Single Use/ Reuse	Single use only	Single use only	Single use only

7. Performance Data

In vivo and *in vitro* testing of the subject device was conducted to demonstrate substantial equivalence of the subject device to its predicate devices. The following performance data are provided in support of the substantial equivalence determination.

Biocompatibility Testing

A series of *in vitro* and *in vivo* biocompatibility testing was performed to assess the safety of the subject device. Testing was determined in accordance with ISO 10993-1 and FDA Guidance on Use of International Standard ISO 10993-1 for the biological evaluation of medical devices within a risk management process. The biocompatibility testing performed is summarized in the table below.

Test	Test Method	Results
Cytotoxicity	L929 MEM Elution Test, ISO 10993-5	Non-cytotoxic
Sensitization	Guinea Pig Maximization, ISO 10993-10	No evidence of causing delayed dermal contact sensitization in the guinea pig
Irritation Intracutaneous Reactivity	ISO Intracutaneous Reactivity in Rabbits, ISO 10993-10	No evidence of irritation or toxicity
Acute Systemic Toxicity	Acute Systemic Toxicity in Mice, ISO 10993-3	No mortality or evidence of systemic toxicity
Pyrogenicity	USP (151) Rabbit Pyrogen Study USP <85> Bacterial Endotoxin Test	Non-pyrogenic
Genotoxicity	Mouse Lymphoma Assay, ISO 10993-3	No evidence of causing increase in the mean mutant frequency of the L5178Y/TK+/- cell line either in the presence or absence of metabolic inactivation. The test article was not mutagenic
	Ames Assay	Non-mutagenic to *Salmonella typhimurium* and to *Escherichia coli* strain WP2uvra
Implantation	Implantation in Canine Intrabony Defect Model, ISO 10993-6	Minimum tissue reaction at 4, 8 and 13 weeks of implantation and no adverse tissue reaction to the host

Test	Test Method	Results
Subacute / Subchronic / Chronic Toxicity	Implantation in Canine Intrabony Defect Model, ISO 10993-11	Minimum tissue reaction at 4, 8, and 13 weeks of implantation and no adverse tissue reaction to the host

A Toxicology Risk Assessment was performed to evaluate formaldehyde residuals. The assessment included an evaluation of information presented in scientific literature and biocompatibility testing conduct on the subject device as well as similar devices. The results of the assessment concluded that the amount of formaldehyde residual for single product use has been addressed. No long-term toxicological effects are anticipated. Risk of exposure to formaldehyde has not been addressed when multiple products are used in a single patient procedure.

Bench Testing

In vitro product characterization testing was performed to demonstrate substantial equivalence of the subject device to its predicate devices. A series of bench tests were conducted to evaluate material properties, biological properties, chemical and physical properties as indicated. Testing of the anorganic bon mineral component was conducted in accordance with ASTM F1581 Standard Specifications for Composition of Anorganic Bone for Surgical Implants.

Test	Results
Mineral Content	Mineral content similar to predicate devices
Size	Sizes similar to predicate devices
Calcium to Phosphate Ratio (mineral only)	Ratio similar to predicate device
Scanning Electron Micrograph (SEM)	Morphologies similar to reference device
X-Ray Diffraction	Similar diffraction patterns to reference device
IR Spectroscopy	Similar functional groups to reference device
Porosity	Porosity similar to predicate
pH	pH similar to predicate device
Absorbency	≥ 5ml/g
Pyrogenicity	Non-pyrogenic

Animal Testing

The performance of the device in a canine one-wall intrabony defect model was compared to the performance of the predicate device, Bio-Oss Collagen. Radiographic, Micro CT, Histology and Histomorphometry analyses were conducted following implantation at 4, 8, and 13 weeks for the subject device, reference device and sham negative control. The results demonstrate performance substantially equivalent to the predicate device Bio-Oss Collagen when used as intended.

Animal Tissue Management

Animal tissues are managed in accordance with the following standards and guidance documents:

- ISO 22442-1 *Animal Tissues and Their Derivatives Utilized in the Manufacture of Medical Devices – Part 1: Analysis and Risk Management*
- ISO 22442-2 *Animal Tissues and Their Derivatives Utilized in the Manufacture of Medical Devices – Part 2: Controls on Sourcing, Collection, and Handling*
- ISO 22442-3 *Animal Tissues and Their Derivatives Utilized in the Manufacture of Medical Devices – Part 3: Validation of the Elimination and/or Inactivation of Viruses and Transmissible Agents*
- Medical Devices Containing Materials Derived from Animal Sources (Except for In Vitro Diagnostic Devices) Guidance for Industry and Food and Drug Administration Staff, CDRH, FDA, March 15, 2019
- FDA Guidance for Industry – Q5A Viral Safety Evaluation of Biotechnology Products Derived from Cell Lines of Human or Animal Origin, CDER, CBER, September 1998

Sterilization

Sterilization validation was performed in accordance with ISO 11137-1 *Sterilization of health care products – Radiation Part 1 Requirements for development, validation and routine control of a sterilization process for medical devices,* ISO 11137-2 *Sterilization of health care products – Radiation Part 2 Establishing the sterilization dose, and* ISO 11737 *Sterilization of Medical Devices - Microbiological Method - Determination of the Population of Microorganisms on Products*.

Pyrogenicity

Porcine Mineral Collagen Composite products are non-pyrogenic. Each batch of product manufactured is tested for endotoxin per the Limulus Amebocyte Lysate (LAL) endotoxin test, USP <85>, as a finished product release test.

Shelf Life and Stability

Product and packaging stability was determined using real-time aging data. Performance testing of packaging system was tested in accordance with ASTM D4169 *Standard Practice for Performance Testing of Shipping Containers and Systems.* Selection, qualification, and validation of packaging were conducted in accordance with ISO 11607 *Packaging for Terminally Sterilized Medical Devices - Requirements for Materials, Sterile Barrier Systems, and Packaging Systems*.

Viral Inactivation

Viral inactivation studies were performed in accordance with ISO 22442-3 to ensure the viral safety of the product.

Clinical Studies

Clinical performance data was not required to determine substantial equivalence.

8. Conclusions Drawn from Non-clinical Studies

The conclusions drawn from the nonclinical tests demonstrate that the device is substantially equivalent to its predicate devices.