



November 8, 2018

Sofregen Medical, Inc.
Anh Hoang, PhD
Chief Scientific Officer
200 Boston Avenue, Suite 1100
Medford, MA 02155

Re: K180631

Trade/Device Name: Silk Voice®

Regulation Number: 21 CFR 874.3620

Regulation Name: Ear, Nose, And Throat Synthetic Polymer Material

Regulatory Class: Class II

Product Code: MIX

Dated: October 5, 2018

Received: October 9, 2018

Dear Anh Hoang:

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/CombinationProducts/GuidanceRegulatoryInformation/ucm597488.htm>); 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 <http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm>.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (<https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/>) and CDRH Learn (<http://www.fda.gov/Training/CDRHLearn>). 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 (<http://www.fda.gov/DICE>) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely yours,

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

Enclosure

Indications for Use

510(k) Number (if known)

K180631

Device Name

Silk Voice

Indications for Use (Describe)

Silk Voice® is indicated for vocal fold medialization and vocal fold insufficiency that may be improved by injection of a soft tissue bulking agent. Silk Voice® injection augments the size of the displaced or deformed vocal fold so that it may meet the opposing fold at the midline for improved phonation. Vocal fold insufficiency associated with serious aspiration difficulties may be an urgent indication.

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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In accordance with 21 CFR 807.87(h) and 21 CFR 807.92, the 510(k) Summary for the Silk Voice Vocal Cord Medialization System is provided below.

1. SUBMITTER

Sofregen Medical, Inc.
200 Boston Avenue, Suite 1100
Medford, MA 02155

Contact Person: Anh Hoang, Ph.D.
Phone: 781-874-2356
Email: ahoang@sofregen.com
Date Prepared: November 4th, 2018

2. DEVICE

Name of Device: Silk Voice
Common Name: System, Vocal Cord Medialization
Classification Regulation: 21 CFR 874.3620
Regulatory Class: II
Product Code: MIX
Panel: Ear, Nose, and Throat

3. PREDICATE DEVICE

Predicate Device: BioForm Medical's Radiesse Laryngeal Implant (K070090)

4. DEVICE DESCRIPTION

Silk Voice[®] is a sterile, non-pyrogenic, cohesive implant provided in a prefilled syringe and is a ready to use product. Silk Voice is comprised of porous bioabsorbable silk particles suspended in an isotonic, aqueous formulation of cross-linked, high molecular weight hyaluronic acid (HA). The crosslinked HA gel acts as a carrier for the silk particles to facilitate delivery. The main component of Silk Voice is silk particles, manufactured exclusively from regenerated silk fibroin protein, isolated from purified, silk fibers. When injected, Silk Voice provides immediate volume augmentation to the vocal fold tissue. The porous particles remain at the site of implantation, providing a scaffold for local tissue infiltration. This cellular infiltrated silk scaffold provides the long term restoration and augmentation.

Silk Voice prefilled syringes are provided in a kit with a catheter, that is designed for endoscopic delivery to the vocal fold. The catheter accessory provided in the kit is specifically designed for delivery of injectable materials into tissue during endoscopic procedures.

5. INDICATIONS FOR USE

Silk Voice[®] is indicated for vocal fold medialization and vocal fold insufficiency that may be improved by injection of a soft tissue bulking agent. Silk Voice[®] injection augments the size of the displaced or deformed vocal fold so that it may meet the opposing fold at the midline for improved phonation. Vocal fold insufficiency associated with serious aspiration difficulties may be an urgent indication.

6. COMPARISON OF TECHNOLOGICAL CHARACTERISTICS

Silk Voice[®] is based on the same technical approach to tissue bulking and vocal fold medialization as the predicate. Both devices are provided sterile in prefilled syringes. Both devices feature a particle component suspended in an aqueous gel carrier.

	SOFREGEN's Silk Voice[®] - Subject Device	BioForm's Radiesse Laryngeal Implant (K070090) - Predicate	Comparison
Intended Use	Vocal fold augmentation	Vocal fold augmentation	Same
Indication for Use	Silk Voice [®] is indicated for vocal fold medialization and vocal fold insufficiency that may be improved by injection of a soft tissue bulking agent. Silk Voice [®] injection augments the size of the displaced or deformed vocal fold so that it may meet the opposing fold at the midline for improved phonation. Vocal fold insufficiency associated with serious aspiration difficulties may be an urgent indication.	BioForm's Radiesse Laryngeal Implant is indicated for vocal fold medialization and vocal fold insufficiency that may be improved by injection of a soft tissue bulking agent. Radiesse Laryngeal Implant injection augments the size of the displaced or deformed vocal fold so that it may meet the opposing fold at the midline for improved phonation. Vocal fold insufficiency associated with serious aspiration difficulties may be an urgent indication.	Same
Intended User	ENT Specialists	ENT Specialists	Same
Composition	Silk particles suspended in a cross-linked, aqueous formulation of HA; 30-40% particle by volume	Calcium hydroxyapatite (CaHA) particles suspended in an aqueous formulation of carboxymethylcellulose (CMC); 30-40% by volume	Similar
Particle component	380 ± 46 µm in diameter; 30-40% by volume	35 ± 10 µm in diameter; 30-40% by volume	Similar
Sterility	Provided sterile, SAL 10 ⁻⁶	Provided sterile, SAL 10 ⁻⁶	Same
How supplied	Prefilled syringe	Prefilled syringe	Same
Delivery	Injection	Injection	Same
Implant duration	Long-term (>6 mo)	Long-term (>6 mo)	Same

Biocompatibility	Tested in accordance with ISO 10993-1	Tested in accordance with ISO 10993-1	Same
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Silk Voice[®] is comprised of porous silk particles, suspended in an HA carrier. The predicate, Radiesse Laryngeal Implant, is comprised of CaHA particles in a CMC carrier. Both devices contain 30-40% particles by volume that function as long-term, bioresorbable, structural/bulking agents. Functionally, the composition of both Silk Voice[®] and the predicate are equivalent.

Both devices have been validated using *in vivo* models to evaluate safety and performance. Both systems have been tested in accordance with the ISO 10993 standard for biocompatibility testing.

Thus, the differences between the devices do not raise new questions of safety or effectiveness for the subject device.

7. NON-CLINICAL TESTING & PERFORMANCE DATA

7.1. Biocompatibility

Silk Voice[®] was tested in accordance with ISO 10993-1:2009 Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process. The following tests were performed:

Silk Voice[®]-Filled Syringes	Accessory Catheter
<ul style="list-style-type: none"> • Subchronic Systemic Toxicity • Mouse Micronucleus • Gene mutation (AMES) assay • Intramuscular Implantation • Intracutaneous (Intradermal) Reactivity • Sensitization • Pyrogenicity • Acute Systemic Toxicity • Cytotoxicity 	<ul style="list-style-type: none"> • Cytotoxicity • Sensitization • Primary Buccal Irritation • Pyrogenicity • Acute Systemic Toxicity

Biocompatibility test results show that Silk Voice[®] meets the requirements of ISO 10993 for its intended use.

7.2. Syringe Leachables/Extractables

The Sofregen Silk Voice syringe was evaluated for leachables/extractables in accordance with ISO 10993-17 and 10993-18. Extraction conditions included aqueous and organic solvents. Exhaustive chemical characterization was performed on the extracts to evaluate: metals, non-volatile solvents, semi-volatile solvents, and volatile solvents after syringe manufacturing and sterilization.

A toxicological risk assessment was performed on the quantitative levels of extractables, and it was determined that the margin of safety is greater than 1000 for adult males and females.

7.3. Shelf Life Testing

Shelf life testing (device and packaging) was performed to support labeled expiration dating for Silk Voice®.

7.4. Bench Testing

Bench testing to characterize the mechanical integrity of the Silk Voice® delivery system included:

- Extrusion force testing is to assess the force required to extrude Silk Voice® through the delivery system
- Catheter peak tensile force testing to confirm that the connections of the finished accessory catheter can meet the minimum peak tensile force requirements from ISO 10555-1:2013
- Catheter leak testing to confirm that the finished accessory catheter is water tight (no signs of leakage) when an appropriate hydraulic pressure is applied.

All bench testing passed the acceptance criteria. The bench testing demonstrated that Silk Voice® delivery system meets pre-established design input requirements for its intended use.

7.5. Animal Study

Silk Voice® was evaluated for local tissue response and migration tendency in a canine model (n=12 Silk Voice; n=12 predicate product) for 12 months. Incremental imaging was performed during the study to evaluate the tissue at the site of injection. Final metrics at the end of study included gross pathology, histopathology of the vocal folds including scoring of inflammation and neovascularization, and histological evaluation of cervical lymph nodes for device migration.

Silk Voice® had comparable tissues responses, including inflammatory cell composition and neovascularization at the injection site, as compared to the predicate. Silk Voice® demonstrated retention of particles at the site of injection in the treated vocal fold.

8. CONCLUSION

Based on the same indications for use (and intended use), device functionality, usage, and performance, the subject Silk Voice® is substantially equivalent to the predicate Radiesse Laryngeal Implant (K070090).