DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center - WO66-G609
Silver Spring, MD 20993-0002

March 24, 2017

Myoscience, Inc.
Tracey Henry
General Manager
46400 Fremont Blvd
Fremont, California 94538

Re: K161835
Trade/Device Name: iovera° System
Regulation Number: 21 CFR 882.4250
Regulation Name: Cryogenic Surgical Device
Regulatory Class: Class II
Product Code: GXH
Dated: February 17, 2017
Received: February 23, 2017

Dear Ms. Henry:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. 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); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm. 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 the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Michael J. Hoffmann -S

for Carlos L. Peña, PhD, MS
Director
Division of Neurological
and Physical Medicine Devices
Office of Device Evaluation
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: January 31, 2017
See PRA Statement below.

510(k) Number *(if known)*
K161835

Device Name
iovera° system

Indications for Use *(Describe)*
The iovera° system is used to destroy tissue during surgical procedures by applying freezing cold. It can also be used to produce lesions in peripheral nervous tissue by the application of cold to the selected site for the blocking of pain. It is also indicated for the relief of pain and symptoms associated with osteoarthritis of the knee for up to 90 days. The iovera° system is not indicated for treatment of central nervous system tissue.

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.

Section 5: 510(k) Summary

Device Information:

Category	Comments
Sponsor / Submitter:	Myoscience, Inc 46400 Fremont Blvd Fremont, CA 94538 Ph: 510.933.1500 Fax: 410.933.1501
Correspondent Contact Information:	Tracey Henry General Manager, Myoscience, Inc Telephone: 510.933.1510 Email: thenry@myoscience.com
Device Common Name:	Cryogenic surgical device
Device Classification & Code:	Class II, GXH
Device Classification Name:	Cryosurgical unit and accessories (21 CFR 882.4250)
Device Trade Name:	iovera° system

a. Predicate Device Information:

510(k) Number	Product	Sponsor
K142866	iovera° system	Myoscience, Inc

b. Date Summary Prepared

15 February 2017

c. Description of Device

The iovera° system is a portable cryogenic surgical device used to destroy tissue and/or produce lesions in nervous tissue creating a nerve block through application of extreme cold to the selected site. The device is based on introduction of a Smart Tip internally cooled by the cryogenic fluid (nitrous oxide, N_2O) to a selected area. The Smart Tip is cooled by the Joule-Thomson Effect and/or Latent Heat of Vaporization. The iovera° system may be used in conjunction with a standard off-the-shelf nerve stimulator device in applications where precise nerve location is desired.

Device Design

The device is comprised of four main components:

1. A reusable Handpiece
2. A Charging Dock
3. An assortment of single-patient use Smart Tips
4. A Cartridge (Nitrous Oxide)

The iovera° Handpiece is battery powered and provides feedback to the user during device preparation and use. The Handpiece connects to both the Cartridge and to the Smart Tip. The user activates a treatment cycle through a control on the Handpiece, which starts and stops the treatment. The Handpiece also contains LEDs for providing feedback to the user when the device is ready to use. The Charging Dock stores the Handpiece between uses and provides power for charging the battery.

An assortment of Smart Tips is available for the iovera° system. All Smart Tip needles are made of stainless steel and have a closed-end that fully contains the cryogen so that it does not enter the target tissue. The Smart Tip is the only patient contacting component of the iovera° system. The user removes the Smart Tip from the sterile packaging and attaches it to the Handpiece.

The iovera° system uses a commercially available nitrous oxide cylinder. The Cartridge is filled with pure N_2O.

Device Functionality/Scientific Concepts

The device functionality is based on the user introducing the Smart Tip to the selected treatment area: unwanted tissue or the target nervous tissue. The user then initiates the flow of cryogen by pressing the on/off button. Liquid cryogen flows from the Handpiece into the closed-end Smart Tip. The Smart Tip is cooled by the Joule-Thomson Effect and/or Latent Heat of Vaporization; as the liquid cryogen expands into a gas, the temperature drops around the external surface of the Smart Tip causing the surrounding tissue to freeze. The treatment is completed after a pre-programmed amount of time at which time the user can safely remove the Smart Tip.

d. Indications for Use

The iovera° system is used to destroy tissue during surgical procedures by applying freezing cold. It can also be used to produce lesions in peripheral nervous tissue by the application of cold to the selected site for the blocking of pain. It is also indicated for the relief of pain and symptoms associated with osteoarthritis of the knee for up to 90 days. The iovera° system is not indicated for treatment of central nervous system tissue.

The Indications for Use statement for the subject device has been expanded to include "for the relief of pain and symptoms associated with osteoarthritis of the knee." This additional wording adds specificity to the already cleared indication. Clinical data demonstrate that this specific use does not affect the safety or effectiveness of the iovera system when used as labeled. There were no new questions of safety or effectiveness raised.

e. Comparison of Technological Characteristics with the Predicate Device

There are no differences in technological characteristics, as summarized below, and therefore no new or different questions of safety and effectiveness for the subject device are raised.

Technological Characteristics	
Predicate Device (K142866)	**Subject Device**
Cryogenic device	Same
Nitrous oxide coolant, pressurized cylinder	Same
Reusable handpiece, battery powered	Same
Single use tip for subdermal cooling, EO sterilized	Same
Charging dock	Same
Sensors, monitor nitrous oxide deliver and rate of cooling	Same
Smart Tip Needle • Length: 6 – 55mm (0.2 – 2.2 in) • Size: Ø.31 – .72mm (25 – 30 gauge) • Patient contacting materials: Closed sharp cutting and blunt tip Stainless Steel needle	Same

f. Performance Data

The following performance data were provided in support of the substantial equivalence determination.

Bench Testing	No bench testing was necessary for the expanded indications for use.
Preclinical Testing Submitted:	No preclinical testing was deemed necessary for the expanded indications for use.
Clinical Testing Submitted:	Clinical testing demonstrating the safety and effectiveness of the iovera° system for the relief of pain and symptoms associated with osteoarthritis of the knee was submitted.

Study Design:
This was a multi-center, prospective, randomized, double-blind, sham-treatment controlled trial. The treating Investigator and Subject were blinded to study treatment. Each Subject was followed a minimum of 120 days post-treatment. Eligible subjects were diagnosed with Grade II or III osteoarthritis of the knee (Kellgren-Lawrence classification grading scale) and washed out of all pain medication. A local anesthetic was used to create a diagnostic block of the infrapatellar branch of the saphenous nerve, as assessed by a 50% decrease in VAS pain upon standing from a seated position or walking up stairs, to confirm that the subject was a candidate for treatment.

121 subjects were treated with the iovera system and 59 subjects were treated with a sham device, with ages ranging from 36 to 75 years. Data from all 180 subjects enrolled were collected and analyzed. The primary endpoint (superiority of the iovera° treatment over sham treatment for reducing pain and symptoms due to osteoarthritis in the knee as assessed by the Total WOMAC scale from baseline to Day 30) was met, p=0.001. Subjects treated with the iovera° system reported substantially more pain and symptom relief as subjects treated with the sham device (55% improvement versus 33% improvement).

Secondary endpoints were also met, including statistically significant superiority of iovera° treatment over sham treatment for relief of pain and symptoms due to osteoarthritis of the knee on the Total WOMAC scale (pain, stiffness, function) at Day 60 and a statistically significant number of patients reported clinically significant pain relief (30% reduction in WOMAC pain score) through 90 days after treatment with the iovera° system.

		Iovera treatment group N=121	Sham control group (n=59)
Reduction in pain and symptoms on Total WOMAC scale 30 days post-treatment		-73.31[1]	-42.18
Percentage of patients reporting 30% improvement in pain and symptoms on Total WOMAC scale post-treatment	30 days 60 days 90 days	74.58% 76.79% 80.18%	44.83% 56.90% 54.39%

[1] LS Means and p-value were obtained by fitting an ANCOVA model with treatment as factor and WOMAC baseline score as a covariate.

There were no serious device-related or procedure-related adverse events. All device-related adverse events were as anticipated per the device labeling. A summary of adverse reactions, including site-specific reactions and/or known effects from cryoanalgesia (e.g., bruising, swelling, redness) which lasted longer than 30 days follows.

Adverse reactions	Iovera N=121	Sham N=59
Numbness	18 (14.8%)	1 (1.7%)
Tenderness upon palpation	14 (11.6%)	8 (13.6%)
Local pain	8 (6.6%)	4 (6.8%)
Altered sensation/ localized dysethesia	3 (2.5%)	2 (3.4%)
Tingling	3 (2.5%)	1 (1.7%)
Swelling	3 (2.5%)	3 (5.1%)
Bruising	3 (2.5%)	2 (3.4%)
Itching	2 (1.6%)	0
Vasovagal response	1 (0.8%)	0
Knee pain	1 (0.8%)	2 (3.4%)
Redness/inflammation	1 (0.8%)	1 (1.7%)
Pain, aggravated	0	1 (1.7%)

g. Conclusion

Use of the already cleared iovera° system in the Clinical Study described herein has shown that the device can be used safely and effectively, within its intended use, to provide relief for pain and symptoms associated with osteoarthritis of the knee. Substantial equivalence to the predicate device has been established, therefore, as there was no change to the intended use or the technological characteristics of the device, and data from the Clinical Study demonstrate safety and efficacy; the primary and secondary endpoints were met and there were no new questions of safety or effectiveness.