July 12, 2023

NanoHive Medical LLC
% Nathan Wright, MS
Engineer & Regulatory Specialist
Empirical Technologies
4628 Northpark Drive
Colorado Springs, Colorado 80918

Re: K231241
Trade/Device Name: NanoHive Medical Lumbar Interbody System
Regulation Number: 21 CFR 888.3080
Regulation Name: Intervertebral Body Fusion Device
Regulatory Class: Class II
Product Code: MAX
Dated: May 15, 2023
Received: May 15, 2023

Dear Nathan Wright:

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,

Brent Showalter -S

Brent Showalter, Ph.D.
Assistant Director
DHT6B: Division of Spinal 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.

Submission Number *(if known)*

K231241

Device Name

NanoHive Medical Lumbar Interbody System

Indications for Use *(Describe)*

The NanoHive Medical Lumbar Interbody System, with a microscopic roughened surface and micro and nano-scale features, is indicated for use in skeletally mature patients with Degenerative Disc Disease (DDD) at one or two contiguous levels from L2-S1. DDD is defined as discogenic back pain with degeneration of the disc confirmed by patient history and radiographic studies. Patients should have received 6 months of non-operative treatment prior to treatment with the devices. The device must be used with supplemental fixation. These DDD patients may also have up to Grade I spondylolisthesis or retrolisthesis at the involved level(s). It is indicated to be used with autograft bone and allograft bone comprised of cancellous and/or corticocancellous bone (hereafter bone graft).

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.

510(K) SUMMARY

Submitter's Name:	NanoHive Medical LLC
Submitter's Address:	12 Gill Street, Suite 4500 Woburn, Massachusetts 01801
Submitter's Telephone:	844-943-5433
Contact Person:	Nathan Wright MS Empirical Technologies 719-351-0248 nwright@empiricaltech.com
Date Summary was Prepared:	May 15, 2023
Trade or Proprietary Name:	NanoHive Medical Lumbar Interbody System
Device Classification Name:	Intervertebral Fusion Device With Bone Graft, Lumbar
Classification & Regulation #:	Class II per 21 CFR §888.3080
Product Code:	MAX
Classification Panel:	Orthopedic – Spinal (DHT6B)

DESCRIPTION OF THE DEVICE SUBJECT TO PREMARKET NOTIFICATION:

The NanoHive Medical Lumbar Interbody System, including the Hive™ PL Interbody System, the Hive™ TL Interbody System, and the Hive™ AL Interbody System, consists of interbody fusion cages made from Ti-6Al-4V implant-grade titanium using additive manufacturing technology. The titanium takes the form of a highly porous core which is surrounded at the cephalad and caudal ends by protective solid titanium endplates. The implant is anatomic in shape and has teeth to ensure placement is maintained after implantation. The interbody cages have a microscopic roughened surface with micro and nano-scale features. The micro and nano features are on all surfaces of the cage, including the superior, inferior, and peripheral surfaces, as well as each member of the internal cell structure. The implants of the NanoHive Medical Lumbar Interbody System are offered in a variety of lengths, widths and cross sectional geometries to accommodate patient anatomy and surgical approach. The implants of the NanoHive Medical Lumbar Interbody System are also offered in various lordotic configurations to ensure proper stability and alignment of the spine for differing patient anatomy. The implants are provided pre-sterile, in validated sterile packaging, and are one-time use only.

The purpose of this submission is to add additional implant size options and sterile packaging configurations to the system.

INDICATIONS FOR USE

The NanoHive Medical Lumbar Interbody System, with a microscopic roughened surface and micro and nano-scale features, is indicated for use in skeletally mature patients with Degenerative Disc Disease (DDD) at one or two contiguous levels from L2-S1. DDD is defined as discogenic back pain with degeneration of the disc confirmed by patient history and radiographic studies. Patients should have received 6 months of non-operative treatment prior to treatment with the devices. The device must be used with supplemental fixation. These DDD patients may also have up to Grade I spondylolisthesis or retrolisthesis at the involved level(s). It is indicated to be used with autograft bone and allograft bone comprised of cancellous and/or corticocancellous bone (hereafter bone graft).

TECHNOLOGICAL CHARACTERISTICS

The subject and predicate devices have nearly identical technological characteristics and the minor differences do not raise any new issues of safety and effectiveness. Specifically, the following characteristics are identical between the subject and predicates:

- Indications for Use
- Principle of Operation
- Structural Support Mechanism
- Materials
- Sterility
- Sizes
- Manufacturing and Biocompatibility

Predicate Devices

510k Number	Trade or Proprietary or Model Name	Manufacturer	Predicate Type
K170676	HD Lumbar Interbody System	HD LifeSciences, LLC	Primary
K201605	EIT Cellular Titanium® ALIF, TLIF, T/PLIF Cages	EIT Emerging Implant Technologies GmbH	Additional
K181380	LnK Lumbar Interbody Fusion Cage System	L&K BIO210800MED Co., Ltd.	Additional
K210800	IO™ Expandable Lumbar Interbody Fusion System	MiRus, LLC	Additional
K181589	Curiteva Lumbar Interbody Fusion System	Curiteva, LLC	Additional

PERFORMANCE DATA

The NanoHive Medical Lumbar Interbody System has been tested in the following test modes:

- Static & Dynamic Axial Compression per ASTM F2077
- Static & Dynamic Compression Shear per ASTM F2077
- Subsidence per ASTM F2267

The results of this non-clinical testing show that the strength of the NanoHive Medical Lumbar Interbody System is sufficient for its intended use and is substantially equivalent to legally marketed predicate devices.

CONCLUSION

The overall technology characteristics and mechanical performance data lead to the conclusion that NanoHive Medical Lumbar Interbody System is substantially equivalent to the predicate device.