April 27, 2019

Tecres S.p.A.
% Christine Brauer, Ph.D.
Regulatory Affairs Consultant
Brauer Device Consultants, LLC
7 Trail House Court
Rockville, Maryland 20850

Re: K181732
Trade/Device Name: InterSpace Knee Extra-Large Size, InterSpace Knee ATS
Regulation Number: 21 CFR 888.3560
Regulation Name: Knee joint patellofemorotibial polymer/metal/polymer semi-constrained cemented prosthesis
Regulatory Class: Class II
Product Code: JWH
Dated: March 27, 2019
Received: March 28, 2019

Dear Dr. Brauer:

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,

For Mark N. Melkerson
Director
Division of Orthopedic 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: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K181732

Device Name
InterSpace Knee Extra-Large Size
InterSpace Knee ATS

Indications for Use *(Describe)*

InterSpace Knee is indicated for temporary use (maximum 180 days) as a total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process.
InterSpace Knee is applied on the femoral condyles and on the tibial plate following removal of the existing implant and radical debridement. The device is intended for use in conjunction with systemic antimicrobial antibiotic therapy (standard treatment approach to an infection).
InterSpace Knee is not intended for use for more than 180 days, at which time it must be explanted and a permanent device implanted or another appropriate treatment performed (e.g. resection arthroplasty, fusion etc.). Because of the inherent mechanical limitations of the device material (gentamicin/polymethylmethacrylate), the Interspace Knee is only indicated for patients who will consistently use traditional mobility assist devices (e.g. crutches, walkers, canes) throughout the implantation period

InterSpace Knee ATS is indicated for temporary use (maximum 180 days) as an adjunct to total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process, and where a large tibial defect is present.
InterSpace Knee ATS is applied on the tibial plate following removal of the existing implant and radical debridement. The device must be combined with the tibial component of InterSpace Knee. The device is intended for use in conjunction with systemic antimicrobial antibiotic therapy (standard treatment approach to an infection).
InterSpace Knee ATS is not intended for use for more than 180 days, at which time it must be explanted and a permanent device implanted or another appropriate treatment performed (e.g. resection arthroplasty, fusion etc.). Because of the inherent mechanical limitations of the device material (gentamicin/polymethylmethacrylate), the Interspace Knee ATS is only indicated for patients who will consistently use traditional mobility assist devices (e.g. crutches, walkers, canes) throughout the implantation period.

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 OF SAFETY AND EFFECTIVENESS

Applicant Information

Applicant:	Tecres S.p.A. Via A. Doria 6 37066 Sommacampagna Verona – Italy
Official Correspondent:	Christine Brauer US Agent for Tecres, S.p.A. Brauer Device Consultants, LLC 7 Trail House Court Rockville, MD 20850 Telephone: 301 545-1990 Email: chris.brauer@comcast.net
Date of Preparation:	March 27, 2019
510(k) Number:	K181732

Device Information

Trade/Proprietary Name:	InterSpace Knee (XL size) InterSpace Knee ATS
Common/Usual Name:	Temporary Knee Spacer with Gentamicin Temporary Augmented Tibial Stem Spacer with gentamicin
Classification Name:	Knee joint patellofemorotibial polymer/metal/polymer semi-constrained cemented prosthesis
Classification Regulation:	21 CFR 888.3560
Class:	II
Product Code:	JWH – Prosthesis, knee, patellofemorotibial, semi-constrained, cemented, polymer/metal/polymer
Panel:	Orthopedic

Device Description

The InterSpace Knee, cleared by FDA via K101356 and K062274, is a temporary spacer device available in three sizes (S-M-L). With this 510(k) submission, Tecres is adding the additional XL size to the FDA cleared range of InterSpace Knee sizes.

The InterSpace Knee ATS is a temporary spacer device available in four sizes, intended to be combined with the tibial component of InterSpace Knee. Specific sizes of the InterSpace Knee ATS are compatible with certain InterSpace Knee sizes.

The devices, as single device (InterSpace Knee, K101356 and K062274) or once InterSpace Knee is combined with the InterSpace Knee ATS, provide patients with a temporary, complete knee implant that allows for a natural range of motion and partial weight-bearing during treatment of the infection, and preserves the soft tissue to prevent further complications, such as muscular contraction, to facilitate the subsequent joint replacement procedure after systemic treatment of the underlying infection.

The InterSpace Knee XL size and InterSpace Knee ATS components are sterile, single-use device intended for temporary use (maximum 180 days) as a partial joint replacement. The devices are made of fully formed polymethylmethacrylate (PMMA), which is radio-opaque and contains gentamicin. The mass used to fill the molds (the unformed PMMA resin) is prepared from powder and liquid components. The liquid component consists of methylmethacrylate (MMA), N,N- dimethyl-p-toluidine and hydroquinone; the powder component consists of PMMA, barium sulphate, benzoyl peroxide and gentamicin sulphate.

Indication for Use

InterSpace Knee

InterSpace Knee is indicated for temporary use (maximum 180 days) as a total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process.

InterSpace Knee is applied on the femoral condyles and on the tibial plate following removal of the existing implant and radical debridement. The device is intended for use in conjunction with systemic antimicrobial antibiotic therapy (standard treatment approach to an infection).

InterSpace Knee is not intended for use for more than 180 days, at which time it must be explanted and a permanent device implanted or another appropriate treatment performed (e.g. resection arthroplasty, fusion etc.). Because of the inherent mechanical limitations of the device material (gentamicin/polymethylmethacrylate), Interspace Knee is only indicated for patients who will consistently use traditional mobility assist devices (e.g. crutches, walkers, canes) throughout the implantation period.

InterSpace Knee ATS

InterSpace Knee ATS is indicated for temporary use (maximum 180 days) as an adjunct to total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process, and where a large tibial defect is present.

InterSpace Knee ATS is applied on the tibial plate following removal of the existing implant and radical debridement. The device must be combined with the tibial component of InterSpace Knee. The device is intended for use in conjunction with systemic antimicrobial antibiotic therapy (standard treatment approach to an infection).

InterSpace Knee ATS is not intended for use for more than 180 days, at which time it must be explanted and a permanent device implanted or another appropriate treatment performed (e.g. resection arthroplasty, fusion etc.). Because of the inherent mechanical limitations of the device material (gentamicin/ polymethylmethacrylate), the Interspace Knee ATS is only indicated for patients who will consistently use traditional mobility assist devices (e.g. crutches, walkers, canes) throughout the implantation period.

InterSpace Knee (XL size): Substantial Equivalence Comparison

For purposes of the substantial equivalence comparisons, the following predicate device was selected:

- Tecres S.p.A. InterSpace Knee which was cleared through 510(k) applications K062274 and K101356.

Intended Use: The InterSpace Knee is intended to be used for patients undergoing a two-stage revision procedure for an infection of a total knee implant. The intended use of the XL size is exactly the same as for the other FDA cleared sizes (S-M-L) (see Table 1).

Table 1. Summary of Intended Use for the InterSpace Knee XL Size Compared to the Predicate Device

Characteristic	**InterSpace Knee (XL size) - Subject Device**	**InterSpace Knee - Predicate Device (K101356, K062274)**
Classification Regulation	888.3560	888.3560
Product Code	*JWH*	*JWH*
Class	II	II
Indication for Use	*…is indicated for temporary use (maximum 180 days) as a total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process…*	*…is indicated for temporary use (maximum 180 days) as a total knee replacement (TKR) in skeletally mature patients undergoing a two-stage procedure due to a septic process…*
Primary Function	Provide a temporary implant to allow for natural range of motion and partial weight-bearing Preserve soft tissue structure	Provide a temporary implant to allow for natural range of motion and partial weight-bearing Preserve soft tissue structure
Secondary Function	To release antibiotics (gentamicin) in the local area	To release antibiotics (gentamicin) in the local area

Characteristic	InterSpace Knee (XL size) - Subject Device	InterSpace Knee - Predicate Device (K101356, K062274)
Target Patient Population	Patients with an infected total knee prosthesis	Patients with an infected total knee prosthesis
Intended Users	Orthopedic surgeons	Orthopedic surgeons
Intended Surgical Procedure	Two-stage knee revision procedure	Two-stage knee revision procedure
Body Contact and Duration	Bone – Maximum of 180 days	Bone – Maximum of 180 days
Prescription Device	Yes	Yes

Comparison of the Technological Characteristics: All the InterSpace Knee sizes (S-M-L-XL) share the same design and technological characteristics (see Table 2).

Table 2: Summary of Technological Characteristics between the InterSpace Knee (XL size) and InterSpace Knee Other Sizes (S-M-L)

Characteristic	Tecres S.p.A. - InterSpace Knee (XL size) - Subject Device	Tecres S.p.A. - InterSpace Knee - Predicate Device (K101356, K062274)
Main Components	Polymethylmethacrylate (PMMA) Methylmethacrylate (MMA) Barium Sulphate	Polymethylmethacrylate (PMMA) Methylmethacrylate (MMA) Barium Sulphate
Other Components	Benzoyl peroxide N,N-Dimethyl-p-toluidine Hydroquinone	Benzoyl peroxide N,N-Dimethyl-p-toluidine Hydroquinone
Antibiotic	Gentamicin Sulphate	Gentamicin Sulphate
Design (shape)	Femoral + Tibial	Femoral + Tibial
Sizes	1 size of femoral + tibial component (XL)	3 sizes of femoral + tibial component (S, M, L)
X-ray visibility	Yes	Yes
Single-use device	Yes	Yes
Provided Sterile	Yes	Yes
Spacer Sterilization Method	Ethylene Oxide	Ethylene Oxide
Sterility Assurance Level (SAL) – Powder	10^{-6}	10^{-6}
Shelf Life	5 years	5 years

Performance Data: This 510(k) notification provided performance evaluation to establish the substantial equivalence of the InterSpace Knee (XL size) to the other sizes already FDA cleared (K062274 and K101356).

Sterilization and Shelf Life: The devices are sterilized using standard methods and the sterilization cycles have been validated following international standards. The sterilization validation complies with: UNI EN ISO 11135:2014; EC 1-2011 UNI EN ISO 11737-1:2006, UNI EN ISO 11737-2:2010, UNI EN ISO 10993-7:2009, UNI EN 556-1:2002, EP current

Edition. The sterilization cycle was validated to a sterility assurance level of 10^{-6}. The shelf life was established through real-time and accelerated aging studies. All demonstrate a shelf life of 5 years.

Biocompatibility: Biocompatibility evaluation has been performed to show the device materials are safe, biocompatible and suitable for their intended use. Both ISO 10993 and FDA Draft Guidance "Use of International Standard ISO 10993, Biological Evaluation of Medical Devices Part 1: Evaluation and Testing within a Risk Management Process" have been taken into account to evaluate the biocompatibility of the device materials. All the Interspace Knee spacer devices (including the XL size) are manufactured with same materials using the same manufacturing process; they share the same tissue contact and duration of contact.

Performance Testing: Performance testing was performed to characterize the InterSpace Knee (XL size):

- Static performances of the resin (ISO 5833): Resin was tested and shown to meet the minimum requirements of ISO 5833.
- Fatigue performances of the resin (ASTM F2118): Resin was tested and shown to meet the acceptance criteria according to ASTM F2118.
- Fatigue test: the bigger size (XL) has been demonstrated to be a better case compared to the other InterSpace Knee sizes (S-M-L).
- Wear test: an evaluation of the debris has been compared with another temporary spacer already cleared by FDA.
- Surface Roughness: surface roughness is the same of the other sizes already approved
- Antibiotic (gentamicin) elution testing: The gentamicin elution profile demonstrated substantial equivalence with gentamicin elution of another temporary spacer already cleared by FDA.

The performance data demonstrate that the new device is substantially equivalent to the predicate device.

InterSpace Knee ATS: Substantial Equivalence Comparison

For purposes of the substantial equivalence comparisons, the following predicate device was selected:

- Knee Modular Spacer which was submitted by Garventis, LLC and cleared through 510(k) application K112470.

The InterSpace Knee ATS when combined with the InterSpace Knee provides a total temporary knee spacer for patients with a large tibial defect; this is analogous to the Knee Modular Spacer.

The following device was selected as a reference device:

- Tecres S.p.A. InterSpace Knee which was cleared originally through 510(k) applications K062274 and K101356.

Intended Use: The InterSpace Knee ATS is intended to be used with the InterSpace Knee for patients undergoing a two-stage revision procedure for an infection of a total knee implant who have a large tibial defect. This is the same intended use as the predicate Knee Modular Spacer (see table below). Both devices provide the same primary function; i.e., allowing for natural range of motion and partial weight bearing and preserving the soft tissue structure. Thus, the InterSpace Knee ATS has the same intended use as the predicate device.

Table 3. Summary of Intended Use for the InterSpace Knee ATS plus InterSpace Knee Compared to the Predicate Device

Characteristics	**InterSpace Knee ATS Plus InterSpace Knee**	**Knee Modular Spacer – Predicate Device**
Classification Regulation	888.3560	888.3360
Product Code	JWH	JWH
Class	II	II
Primary Function	Provide a temporary implant to allow for natural range of motion and partial weight-bearing Preserve soft tissue structure	Provide a temporary implant to allow for natural range of motion and partial weight-bearing Preserve soft tissue structure
Secondary Function	To release antibiotic (gentamicin) in the local area	To release antibiotic (gentamicin) in the local area
Target Patient Population	Patients with an infected knee prosthesis	Patients with an infected knee prosthesis
Intended Users	Orthopedic surgeons	Orthopedic surgeons
Intended Surgical Procedure	Two-stage knee revision procedure	Two-stage knee revision procedure
Body Contact and Duration	Bone – Maximum of 180 days	Bone – Maximum of 180 days
Prescription Device	Yes	Yes

Comparison of the Technological Characteristics: The combined InterSpace Knee ATS plus InterSpace Knee share the same design and technological characteristics as the Knee Modular Spacer (see table). Both temporary spacers are made from gentamicin-loaded PMMA bone cement. Both consist of modular components with a tibial insert. Both are provided sterile for single-use.

Table 4: Summary of Technological Characteristics between the InterSpace Knee ATS plus InterSpace Knee and the Predicate Device

Characteristics	**InterSpace Knee ATS Plus InterSpace Knee**	**Knee Modular Spacer – Predicate Device**
Total Knee Components	Femoral component Tibial component ATS component (optional)	Femoral component Tibial component Tibial insert (optional)
Component Materials	Antibiotic loaded PMMA	Antibiotic loaded PMMA with color additive (details not specified in the 510k Summary)
Antibiotic	Gentamicin	Gentamicin
Sizes	4 InterSpace Knee (femoral + tibial) 4 InterSpace Knee ATS	Femoral and tibial components Optional tibial insert

Characteristics	InterSpace Knee ATS Plus InterSpace Knee	Knee Modular Spacer – Predicate Device
		Available in a range of sizes; further details unspecified in 510(k) Summary
Modularity	Yes. InterSpace Knee ATS matches in size to be compatible with specific InterSpace Knee sizes.	Yes. Femoral component can be combined with tibial component; tibial component can be combined with optional tibial insert
Augment	ATS component	Tibial insert
Function of the Augment	Optional Increase the thickness	Optional Increase the thickness
Radiopaque	Yes	Yes
Single-use device	Yes	Yes
Provided Sterile	Yes	Yes

For a comparison of certain technological characteristics, the InterSpace Knee ATS is compared to the InterSpace Knee as a reference device. The InterSpace Knee ATS shares many of the same technological characteristics as the InterSpace Knee, including the identical materials, and same PMMA bone cement formulation including antibiotic concentration. The technological characteristics are the same between the proposed device and the reference device (see table).

Table 5: Summary of Technological Characteristics between the InterSpace Knee ATS and the InterSpace Knee

Characteristics	InterSpace Knee ATS	InterSpace Knee
Main Components	Polymethylmethacrylate (PMMA) Methylmethacrylate (MMA) Barium Sulphate	Polymethylmethacrylate (PMMA) Methylmethacrylate (MMA) Barium Sulphate
Other Components	Benzoyl peroxide N,N-Dimethyl-p-toluidine Hydroquinone	Benzoyl peroxide N,N-Dimethyl-p-toluidine Hydroquinone
Antibiotic	Gentamicin Sulphate	Gentamicin Sulphate
Design (shape)	Tibial Augment for use with the InterSpace Knee	Femoral + Tibial
Sizes	4 sizes matching the InterSpace Knee tibial components	4 sizes
X-ray visibility	Yes	Yes
Single-use device	Yes	Yes
Provided Sterile	Yes	Yes
Spacer Sterilization Method	Ethylene Oxide	Ethylene Oxide
Sterility Assurance Level (SAL) – Powder	10^{-6}	10^{-6}
Shelf Life	5 years	5 years

Performance Data: This 510(k) notification provided performance data to establish the substantial equivalence of the InterSpace Knee ATS to the predicate device or the reference device. The following is a summary of the performance data.

Sterilization and Shelf Life: The devices are sterilized using standard methods and the sterilization cycles have been validated following international standards. The sterilization validation complies with: UNI EN ISO 11135:2014; EC 1-2011 UNI EN ISO 11737-1:2006, UNI EN ISO 11737-2:2010, UNI EN ISO 10993-7:2009, UNI EN 556-1:2002, EP current Edition. The sterilization cycle was validated to a sterility assurance level of 10^{-6}. The shelf life was established through real-time and accelerated aging studies. All demonstrate a shelf life of 5 years.

Biocompatibility: Biocompatibility evaluation has been performed to show the device materials are safe, biocompatible and suitable for their intended use. Both ISO 10993 and FDA Draft Guidance "Use of International Standard ISO 10993, Biological Evaluation of Medical Devices Part 1: Evaluation and Testing within a Risk Management Process" have been taken into account to evaluate the biocompatibility of the device materials. The device materials of the InterSpace Knee ATS are identical to the InterSpace Knee, which share the same tissue contact and duration of contact.

Performance Testing: Performance testing was performed to characterize the InterSpace Knee ATS. Performance testing was performed on either the InterSpace Knee ATS or the InterSpace Knee and included an evaluation of the following:

- Static performances of the resin (ISO 5833): Resin was tested and shown to meet the minimum requirements of ISO 5833.
- Fatigue performances of the resin (ASTM F2118): Resin was tested and shown to meet the acceptance criteria according to ASTM F2118.
- Fatigue test on the device has been performed according to ASTM F1800.
- Antibiotic (gentamicin) elution testing: The gentamicin elution profile demonstrated substantial equivalence with gentamicin elution of another temporary spacer already cleared by FDA.

The performance data demonstrate that the new device is substantially equivalent to the predicate device.