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\*Laboratory studies are not necessarily indicative of clinical performance.

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### Persona Revision Knee System



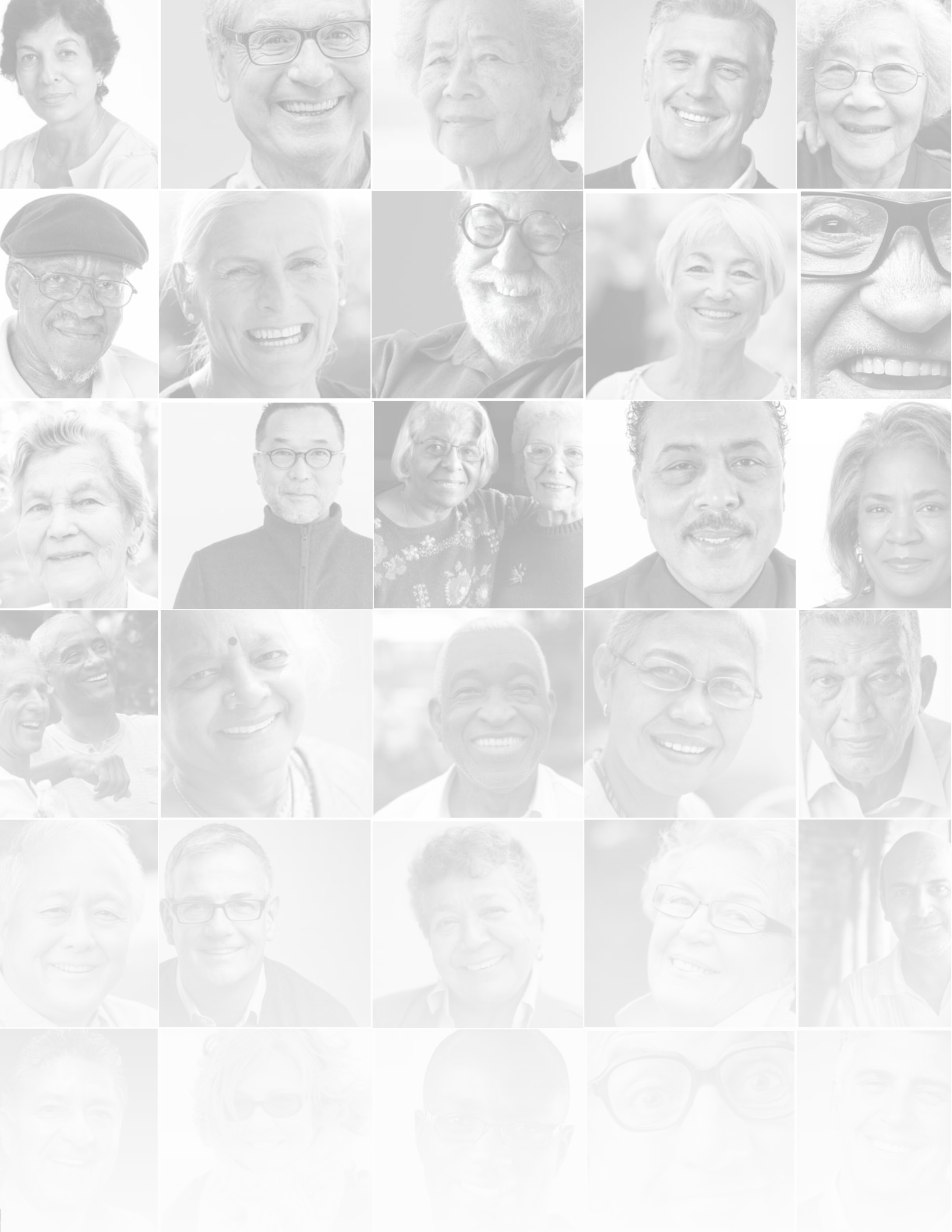
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# Persona<sup>®</sup>

REVISION KNEE SYSTEM







# INTRODUCING THE PERSONA REVISION KNEE SYSTEM

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THE POWER TO PERSONALIZE™  
PERSONALIZED. PRECISE. PROVEN.

Personalized implants, precise instrumentation and proven technologies enable surgeons with the ability to personalize their surgical experience to best meet the needs of each patient.

Persona Revision offers anatomic implant geometry to provide patients an individualized fit while achieving the desired bone coverage, fixation<sup>1</sup> and stability. The intuitive instrumentation platform empowers surgeons with the flexibility to tailor their surgical approach intraoperatively, while the streamlined delivery system's modularity is designed to help increase OR efficiencies and workflow. Combined with the clinically successful Trabecular Metal™ Material<sup>2-4</sup> and Vivacit-E® Highly Crosslinked Polyethylene,<sup>5-10</sup> Persona Revision truly offers personalization for revision knee arthroplasty.



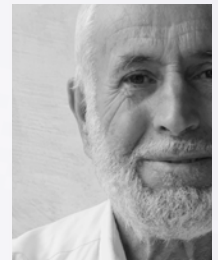
THE PERSONA REVISION KNEE  
SYSTEM ENABLES SURGEONS WITH  
**THE ABILITY TO PERSONALIZE**  
REVISION KNEE ARTHROPLASTY.

- 1 Anatomic Tibial Baseplate to Help Achieve Proper Rotation, Bone Coverage and Minimization of Offset Stem Use**
- 2 Enhanced Stem Portfolio to Address Fixation Needs for Varying Patient Anatomy**
- 3 Proven Fixation with Trabecular Metal Material Designed to Facilitate Bony In-growth**
- 4 Trabecular Metal and Titanium Tibial and Femoral Augments Designed to Provide Structural Support in Areas of Bone Loss**
- 5 Multiple Femoral Options to Address Flexion Instability and Soft Tissue Balancing While Minimizing Implant Overhang**
- 6 Premium Bearing Technology Offered in a Full Continuum of Constraint**



## WHEN SOMETHING WORKS WELL, WHY CHANGE IT?

Built on a legacy of clinical heritage, components of the Persona Revision Knee System are evolutionary refinements of their respective predecessors: Persona the Personalized Knee, NexGen® Legacy Constrained Condylar Knee, Natural-Knee® II, and Vanguard SSK/ 360 Revision Knee System. These design and material properties have a combined clinical history of over 55 years on the market.<sup>11-14</sup> By integrating the successful design elements from its predecessors, Persona Revision was born with an updated implant design, modernized instrumentation platform and advanced technologies.



### TRABECULAR METAL TECHNOLOGY

- Over 20 years of clinical history<sup>2-4</sup>
- Well documented in over 350+ peer reviewed journal articles, poster exhibits and abstracts

### VANGUARD® SSK/360 REVISION KNEE SYSTEMS

- 93% survivorship at 4 years<sup>15</sup>



### VIVACIT E® VITAMIN-E HIGHLY CROSSLINKED POLYETHYLENE

Actively stabilized with Vitamin-E to help protect against oxidation and maintain wear resistance and strength throughout the life of the implant. Exceptional oxidative stability,<sup>5,6</sup> ultra-low wear<sup>7,8</sup> and enhanced strength.<sup>9,10</sup>

### NEXGEN® LEGACY® CONSTRAINED CONDYLAR KNEE (LCCK)

- 97.6% survivorship at 10+ years in a primary knee arthroplasty<sup>16</sup>
- 96% survivorship at 10+ years in a revision knee arthroplasty<sup>17</sup>
- 92% survivorship at 16 years in a revision knee arthroplasty<sup>18</sup>





# PERSONALIZED IMPLANTS

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## ACHIEVING AN INDIVIDUALIZED FIT.

When designing the Persona Revision Implants, the ultimate goal was to create the most anatomic revision system on the market. During the design process, extensive research was performed using the ZiBRA™ Anatomical Modeling System which studied the morphology of native tibias of various ethnicities, genders and sizes.

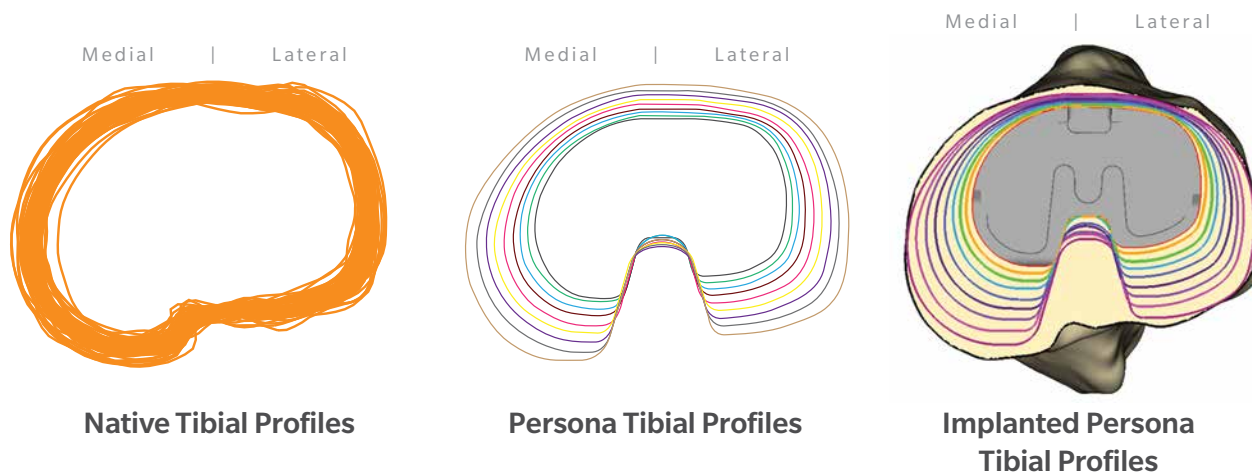
Data showed previous asymmetric and symmetric tibial designs once served a purpose, but surgeons had to choose between rotation, coverage and position.<sup>19</sup> The anatomic implant geometry of the Persona Revision Tibia should help achieve proper rotation, position and optimal bone coverage.

Persona Revision offers surgeons an array of anatomic components designed with patient anatomy in mind. The system provides tibial and femoral cones and numerous stem choices to address fixation needs while the femoral components and multiple bearing constraint options aim to restore soft tissue balance and stability. With these advancements, Persona Revision can offer patients a truly individualized implant fit.



# Anatomic Implants

The Persona Primary and Revision Tibial Implants were designed by studying the morphology of native tibias of various ethnicities, genders and sizes. Hundreds of virtual tibial resections were performed using the ZIBRA Anatomic Modeling System with varying surgical parameters. This thorough research helped to better understand that the variation of the tibial shape was only subtle between ethnicities and gender. It was determined that the ideal size and shape of the tibial implant should be anatomic.



## Tibial Component

The shape of the Persona Primary Tibial Implant was incorporated into the anatomic design of the Persona Revision Tibial Implant. This consistent design provides a unified system approach giving surgeons the confidence to address both difficult primary and complex revision knee arthroplasties. In vitro, the Persona Anatomic Tibia has demonstrated:

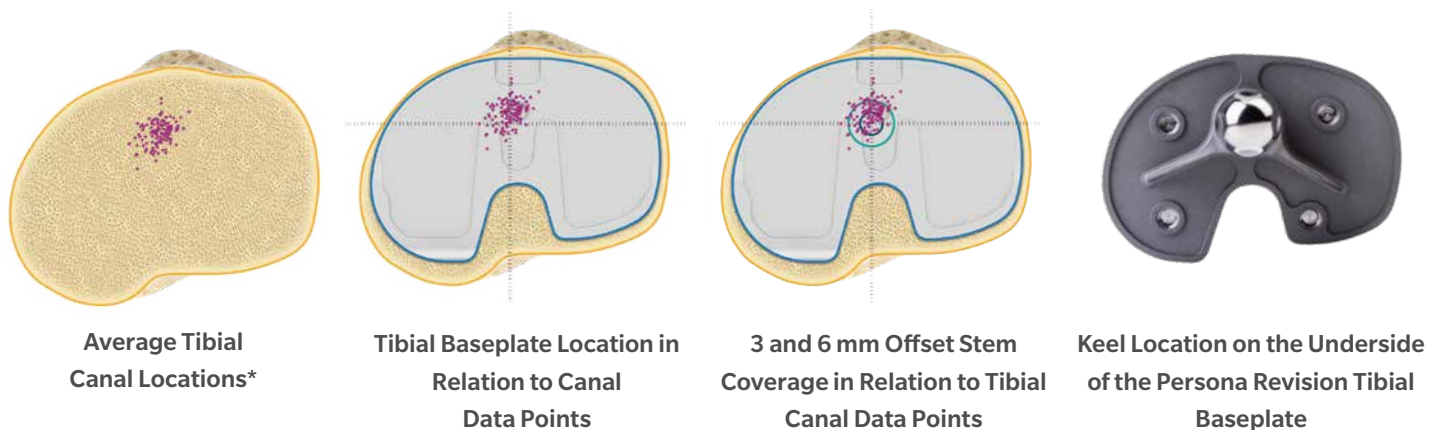
- 92 percent bone coverage with proper rotation<sup>19</sup>
- Less compromise of coverage (0.5 percent anatomic vs 5 percent non-anatomic)<sup>19</sup>
- Six percent average improvement in coverage compared to non-anatomic designs<sup>19</sup>



## Medialized Tibial Keel

The ZiBRA Anatomic Modeling System database was also utilized to determine proper stem housing location. By observing the location of the native diaphysis compared to the outer tibial implant shape, an anterior medialized keel was determined to be the most anatomically accurate location.<sup>20</sup>

ZiBRA data was also used to determine that the 3 mm and 6 mm offset stems would help achieve optimal coverage and rotation for almost all ZiBRA model data resulting in a desired fit as shown in the graphic below.<sup>20</sup>



### Persona Revision Tibial Implant Specifications

- Nine left and right anatomic micro, macro and core sizes (A-J)
- Anatomic disproportional M/L growth
- Compatible with all Persona Stems (tapered, smooth and splined designs)
- Triple wedge bearing locking mechanism
- No through holes to prevent osteolytic pathways
- Made of Tivanium® Alloy (titanium)
- Compatible with anatomic Trabecular Metal and Tivanium Tibial Augments to minimize bone overhang

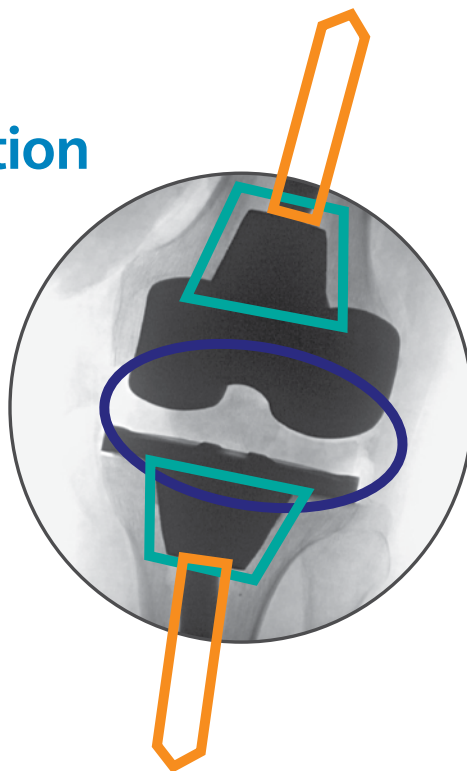


**3 mm Offset Splined Stem**

**6 mm Offset Splined Stem**

## Achieving Zonal Fixation

One study shows that in order to achieve robust implant fixation, most successful knee revision procedures require a combined approach to fixation with a multi-zone strategy.<sup>21</sup> There are three anatomical zones; the joint surface (epiphysis), metaphysis and diaphysis. To provide a stable construct, two of the three zones must achieve adequate fixation. Persona Revision offers numerous anatomic tibial and femoral cones, augments and an array of stem options to address fixation needs.



Zone 3 – Diaphysis

Zone 2 – Metaphysis

Zone 1 – Joint Surface (Epiphysis)

Zone 2 – Metaphysis

Zone 3 – Diaphysis

## Anatomic Tibial and Femoral Trabecular Metal Cones

At times while performing revision TKAs, surgeons encounter bone defects and poor bone quality that make it challenging to restore the patient's natural knee. "The achievement of solid fixation of revision implants is essential to allow early post-operative mobilization and rehabilitation, and improves the longevity of the construct".<sup>21</sup> Persona Revision Trabecular Metal Cones provide customers a solution to effectively fill bone defects to closely replicate patients normal anatomy. The proven<sup>2-4</sup> Trabecular Metal material offers increased biological fixation and distributes loads closer to the joint line.

- Anatomic shapes designed to fill bone voids without cortical impingement<sup>22</sup>
- Designed to fill cavitory bone defects and provide a stable platform for femoral and/or tibial articulating components<sup>23</sup>
- Cones are designed to facilitate biologic fixation and promote a load sharing construct



Tibial Central Cone



Tibial Perimeter Cone



Femoral Central Cone



Femoral Metaphyseal Cone



## Enhanced Stem Design

Boasting one of the most robust stem portfolios on the market, the Persona Revision Knee System presents customers an array of stem configurations in multiple lengths and sizes to address varying patient anatomy.

- 135 mm and 175 mm lengths designed to achieve the desired diaphyseal engagement
- Offset splined stem design promotes precise femoral and tibial component placement
  - Monolithic offset splined stem design reduces the potential for fretting and corrosion
  - Shortened offset stem transition closer to the joint line results in a better fitting implant with less bone removal<sup>24</sup> and area to fill with cement
- Tapered connection for ease of implant removal over threaded type of stem connections

### Stem Implant Specifications

- **Tapered Stems**  
+30 mm\* and +75 mm lengths  
11 mm and 14 mm diameters  
\*Additional compatibility with Persona Primary 5 Degree Tibial Component
- **Smooth Stems**  
+135 mm and +175 mm lengths  
10-24 mm diameters in 2 mm increments
- **Splined Stems**  
0 mm (straight), 3 mm and 6 mm offset configurations  
+135 mm and +175 mm lengths  
10-18 mm diameters in 1 mm increments  
20-24 mm diameters in 2 mm increments

Note: + in addition to stem housing



# Restoring Soft Tissue Balance

One of the most common causes of implant failure is joint instability.<sup>25-27</sup> In an effort to address joint instability, Persona Revision's multiple femoral components in varying sizes, along with a vast continuum of bearing constraints provide surgeons the tools to help achieve a stable knee.

## Femoral Components

Persona Revision offers both standard and plus femoral component options. The plus femoral components feature a Flexion Fill™ design, with an additional +3 mm of posterior condylar offset to provide additional flexion stability compared to the corresponding standard size. This addresses flexion laxity without the need to upsize, offset or augment the femur to accommodate soft tissue needs while not affecting implant overhang.



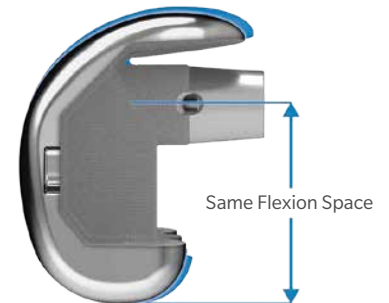
The plus femoral components can also be used to achieve a narrow femoral option. To achieve a narrow femoral option, the size smaller plus femoral component can be used to fill the same flexion space with a smaller M/L dimension.

## Standard and Plus Femurs as a Narrow Option



M/L Femoral Size Comparison

Blue Outline: Size 7 Standard Femur  
Gray: Size 5 Plus Femur



A/P Femoral Size Comparison

## Femoral Implant Specifications

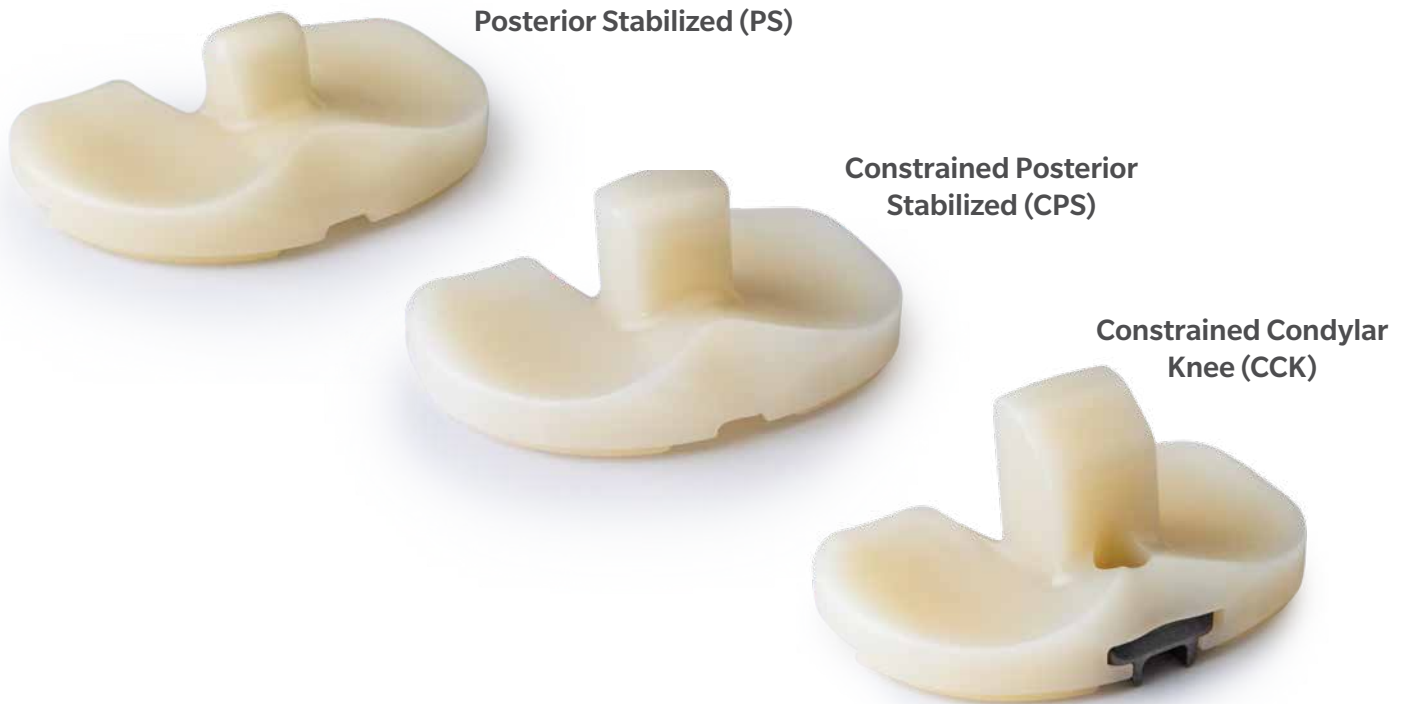
- 13 left and right sizes available in two distinct profiles, standard and plus\*
- Designed to accommodate up to 135° of flexion
- Compatible with PS, CPS and CCK Bearings
- Compatible with the Persona Primary 5 Degree Stemmed Tibial Component with a 14mm x +30 mm stem extension
- Compatible with Trabecular Metal and Titanium distal and posterior augments available in sizes 5, 10 and 15 mm\*\*

\*Plus femur not available in size 13

\*\*15 mm augments are not available for femoral sizes 1 and 3  
All augment sizes can be used together in any configuration

## Continuum of Constraint

The Persona Revision Knee System includes a full continuum of constraint offering Posterior Stabilized (PS), Constrained Posterior Stabilized (CPS) and Constrained Condylar Knee (CCK) Bearings available in Vitamin-E and Conventional polyethylene\*. All bearings are compatible with the Persona Primary 5 Degree Stemmed Tibia and Persona Revision Tibial Components. From no constraint to full constraint, the system helps achieve a balanced, stable knee.



### Bearing Implant Specifications

- PS Bearing offered in 1 mm increments\*\*
- CPS and CCK Bearings offered in 2 mm increments
- CCK Bearings available in thicknesses of 10-26 mm
- CCK Bearing Lock Down Screw is designed to prevent torque loss<sup>28</sup> to improve screw backout resistance
- CCK Bearing offers a highly constrained option
- Patella friendly chamfer designed to help reduce impingement in high flexion

\* Conventional polyethylene available in PS Only

\*\* PS 1 mm 10-14 mm and 2 mm 16-20 mm



# PRECISE INSTRUMENTATION

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WITH A PERSONALIZED APPROACH.

Patient outcomes can be driven by the precision and accuracy of each step within the surgical procedure. In order to streamline workflow and provide a more personalized approach to instrumentation selection, the surgical techniques allow surgeons to individualize the surgical experience based on the patient's bone and joint condition.

The instrumentation allows surgeons to intraoperatively transition from a primary to a revision component using a condensed revision conversion set. This conversion instrumentation provides the flexibility to make efficient surgical decisions based on the specific needs of the patient.

These advancements along with updated instrumentation allow for simplified decisions tailored to surgical preference, philosophy and approach to achieve a personalized procedure.





CCK 7

7/7+L

7-9+IE-F

CCK

E L 0°

CDEF  
FIXED

# Comprehensive Instrument Platform

Persona Revision Instrumentation was designed to be versatile in its capabilities and philosophies, precise in its measurements, comprehensive and comfortable with repetitive use. These options allow for more control, a smooth surgical flow and reproducible outcomes.

## Instrumentation Design

- Multipurpose instrumentation design reduces excess tray weight and redundant instrumentation
- Anatomic contouring and ergonomic mechanical grip feature of the instruments designed to maximize comfort and control over repetitive use<sup>29</sup>
- Weight balanced design helps minimize strain and allow for improved reproducibility and accuracy<sup>29</sup>
- Proprietary surface finish reduces intraoperative glare and provides an enhanced grip in the surgical environment<sup>29</sup>
- Enables postponement of bone cuts until flexion and extension gaps have been determined for trial early philosophy
- Lockable connections for cutting instruments designed to eliminate pin use and improve accuracy of cuts



## TASP System

The Tibial Articular Surface Provisional (TASP) adds sophistication to the trialing system.

- Seamless soft tissue balancing with no need to remove the provisional
- Effortlessly make 2 mm adjustments designed to find the optimal bearing thickness every time
- Available in PS, CPS and CCK constraints



## Personalized Surgical Techniques

The adaptable instrumentation and personalized surgical workflow accommodates surgeon's preferred philosophy or patient anatomy. The surgical techniques are capable of supporting various surgeon defined workflows such as:

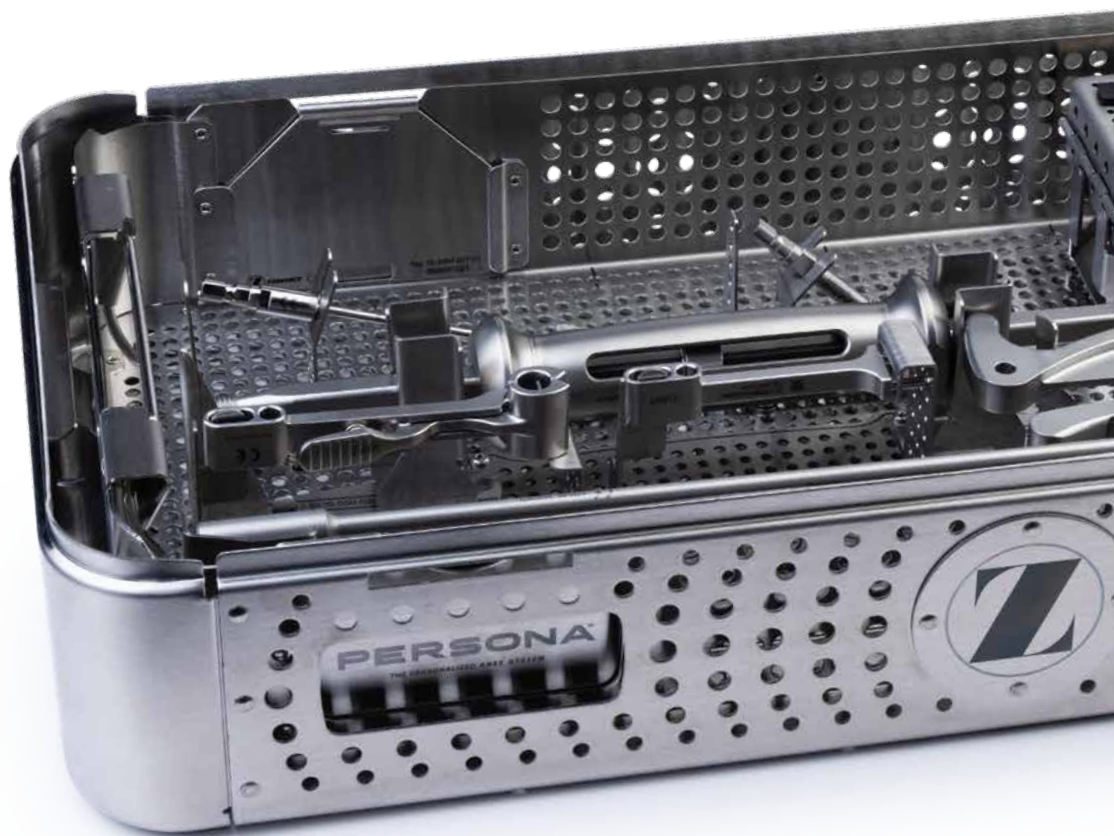
- Standard Method
- Zonal Fixation (cones)
- Trial Early Method
- Primary Conversion
- Short Cemented Stem



## Streamlined Delivery System

Revision systems have historically been bulky, containing redundant instrumentation that takes up tray space and clutters the OR and central sterile department leading to inefficiencies. Persona Revision's efficient kitting strategy with modular brackets aims to eliminate nonessential instrumentation and allows for adaptable tray configurations based on surgeon defined workflow and hospital preference to help reduce the burden of inventory management.

- Allows for personalization of trays based on procedure or surgical philosophy
- Simplified back-table set-up saving space and clutter in the sterile field
- Configured to reduce instrument footprint while providing the full array of implant offerings



## Condensed Femoral Revision Set

Persona Revision provides surgeons a three tray condensed femoral set to address difficult primary arthroplasty. The primary to revision conversion instrumentation allows for a seamless transition from a primary to a stemmed revision femoral component with a CCK bearing intraoperatively based on patient soft tissue and fixation needs. This concise set offers an efficient solution by reducing the number of typical revision trays required in the OR to back up a primary case.



# PROVEN TECHNOLOGY

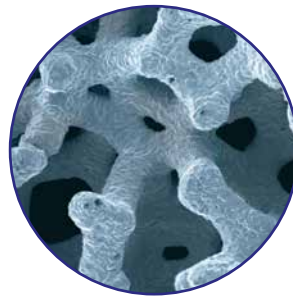
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BUILT ON CLINICAL PERFORMANCE.

Persona Revision boasts the most clinically proven<sup>2-4</sup> biological fixation portfolio on the market with over 20 years of successful clinical use. Combined with our premium bearing technology, Persona Revision Knee System provides customers with solutions to improve patient outcomes.

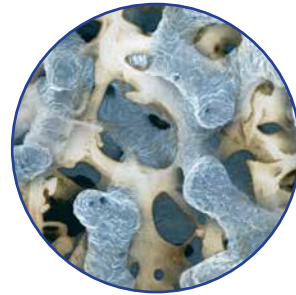






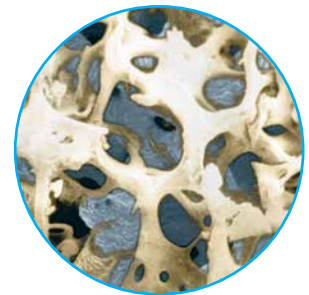
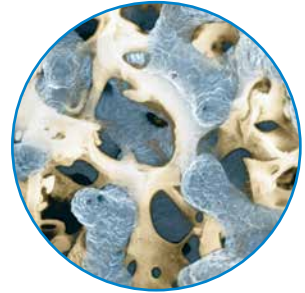
## Trabecular Metal Technology

For more than 20 years, Trabecular Metal Technology has clinically demonstrated excellent initial stability and biologic in-growth not only in knees, but in many orthopedic applications.<sup>2-4,30</sup> This highly porous material is designed to replicate the structure, function and physiological properties of cancellous bone.<sup>31</sup>



Trabecular Metal Technology is available in multiple sized femoral and tibial cones, femoral and tibial augments and patellar implants giving surgeons the power to select the right implant to best meet the needs of each patient.

- Made from commercially pure elemental Tantalum
- Cancellous architecture up to 80% porosity with a 100% open-interconnected cell structure with an average pore size of 440 microns designed to support bony in-growth and vascularization<sup>31,32</sup>
- Published 0.98 coefficient of friction\* against cancellous bone for initial stability<sup>32</sup>

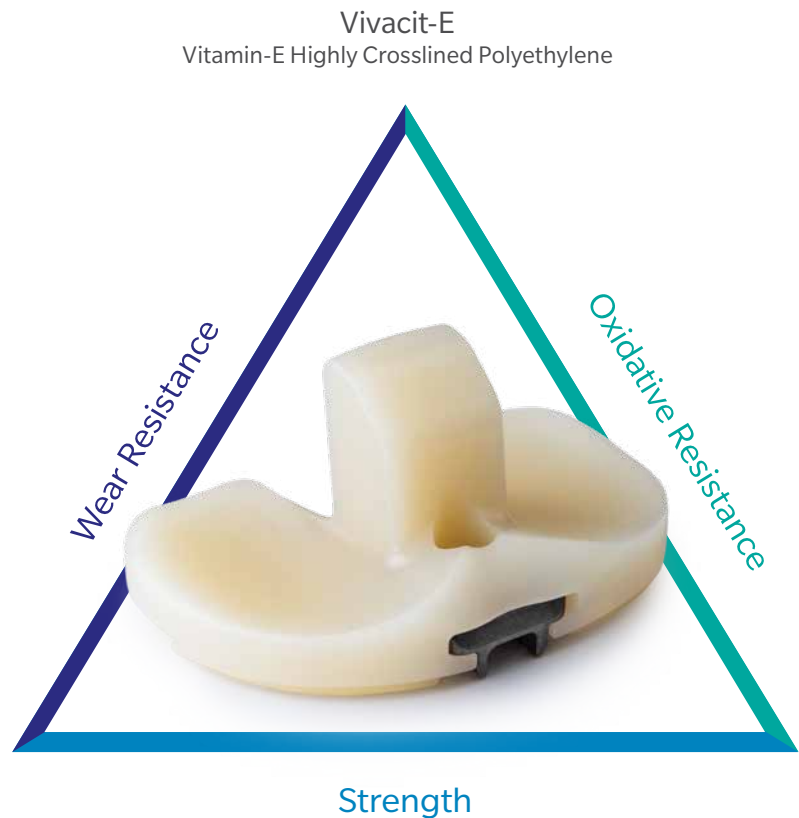


\*For net-shaped Trabecular Metal Material.

## Vivacit-E Vitamin-E Highly Crosslinked Polyethylene (HXPE)

Patients are expecting more out of their implants, and with that in mind, Persona Revision Bearings were created exclusively out of Vivacit-E Vitamin-E Highly Crosslinked Polyethylene. Vivacit-E Polyethylene is actively stabilized with Vitamin-E to help protect against oxidation and maintain wear resistance and strength throughout the life of the implant.

- Stresses in the CCK Bearing Spine are lower than that of the PS Bearing Spine which demonstrated a 10% improvement in spine fatigue strength over conventional polyethylene<sup>14, 15\*</sup>
- Exceptional oxidative stability with delamination resistance and retention of mechanical properties 12 times longer than industry standards<sup>10, 11\*</sup>
- Vivacit-E Highly Crosslinked Polyethylene (HXPE) results in a technologically advanced material that provides mechanical strength, superior oxidative stability and wear resistance over other polyethylenes<sup>10-15\*</sup>
- Ultra-low wear with 96 percent wear reduction compared to conventional polyethylene and 73 percent wear reduction compared to re-melted HXPE polyethylene<sup>12, 13\*</sup>



\*Laboratory testing not necessarily indicative of clinical performance.

# BREAKING THE REVISION CYCLE

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It is time to break the revision cycle and focus on the entire patient journey. From diagnosis to patient specific re-implantation, we unite customizable, interconnected and interdependent services and solutions to address each unique episode of care.



Diagnosis



Extraction



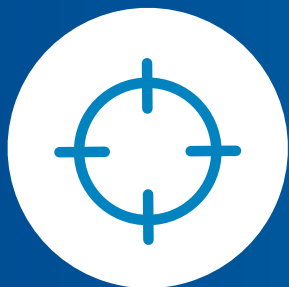
Care



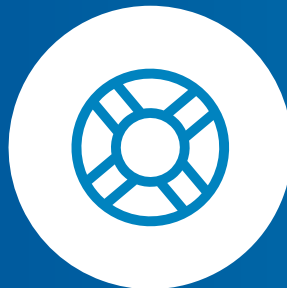
Therapy



Re-implantation



Patient  
Specific Solutions

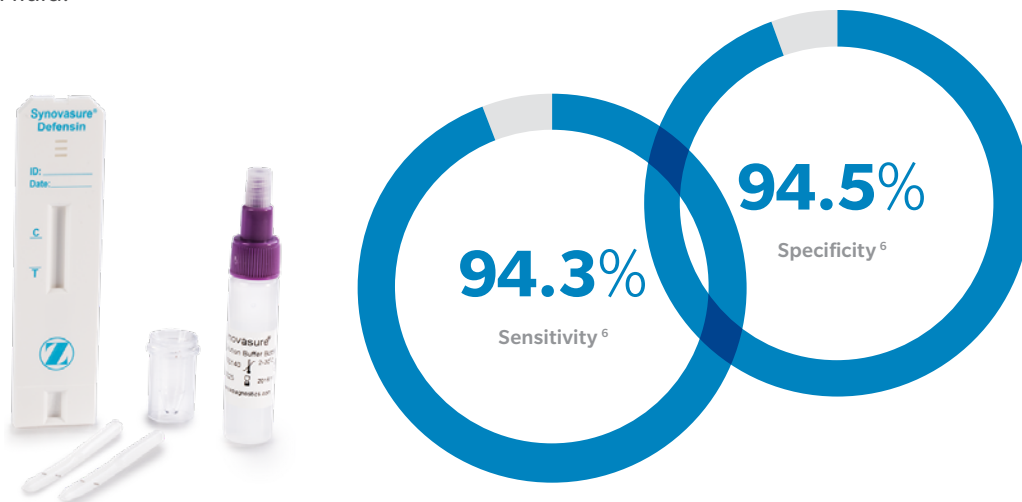


Limb Salvage

# Uniting Innovative Solutions

## Infection Diagnostic Solution

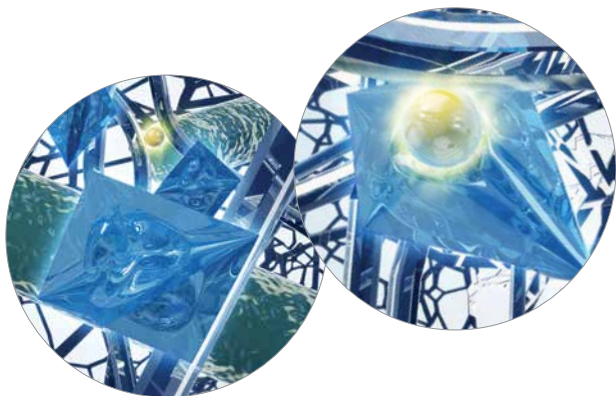
Diagnosis of Periprosthetic Joint Infection (PJI) continues to be a major challenge for orthopedic surgeons, especially in late and delayed infections.<sup>33, 34</sup> Synovasure® Alpha Defensin Lateral Flow Test is the only in-vitro diagnostic device specifically designed to aid in the diagnosis of PJI by rapidly and accurately\* detecting alpha defensin biomarkers in synovial fluid.



\*Synovasure Alpha Defensin Lateral Flow Test is 94.3% sensitive and 94.5% specific against the standard of care criteria, excluding samples diluted with >20% blood (RBC>1,000,000)<sup>35</sup>

## Microorganism Lavage Solution

Bacteria can produce Extracellular Polymeric Substance (EPS) to shield themselves from both mechanical and chemical attack. Bactisure™ Wound Lavage\* was specifically designed to remove these structurally resistant forms of bacteria by physically deconstructing the EPS matrix, making bacteria more susceptible to traditional antibiotics and the body's normal defense mechanism.



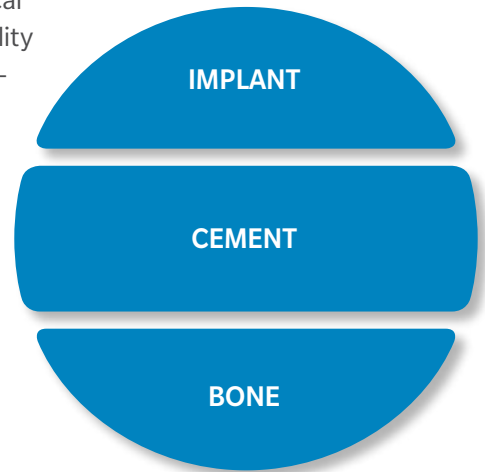
Bactisure Wound Lavage is intended to be used with jet lavage (Zimmer Pulsavac® Plus or Pulsavac Plus AC) for cleansing and removal of debris, including microorganisms, from wounds.

\*Bactisure Wound Lavage is not CE marked.

## Modern Cementing Technique (MCT) - improved clinical outcome<sup>36-38</sup>

Modern Cementing Technique Knee (MCT Knee) addresses implant loosening with the objective to provide long term implant stability in knee arthroplasty and is incorporated into the Persona Revision Surgical Technique. The objective of MCT in facilitating long term implant stability is to optimize cement quality and the interfaces between both Implant-Cement and Cement-Bone.<sup>39\*, 40</sup>

Zimmer Biomet offers solutions for standardized mixing procedures resulting in homogeneous cement with very low porosity. The mixing and collection under vacuum reduces the cement's porosity, which can lead to improvements in cement strength and fatigue life.<sup>41\*, 42\*</sup>



## Antibiotic-loaded Bone Cement - may reduce risk of re-infection<sup>43</sup>

Gentamicin has shown to be the antibiotic of choice for bone cement, as its broad therapeutic spectrum covers gram-positive and gram-negative bacteria. Gentamicin is bactericidal and its release from the bone cement is superior to that of other antibiotics.<sup>44</sup>

Zimmer Biomet bone cements including gentamicin, where available, have shown to provide antibiotic release over several days.<sup>45\*</sup>



\*\* Refobacin® Revision is not available in the United States.

StageOne™ Knee  
Cement Spacer Molds

\* Laboratory testing is not necessarily indicative of clinical performance.

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