OPTETRAK
LOGIC®
Design Rationale

TOTAL KNEE SYSTEM

WHEN INNOVATION AND INTUITION ALIGN.

Exactech began as a vision shared by orthopaedic surgeon Bill Petty, his wife Betty, and biomedical engineer Gary Miller, PhD. Drs. Miller and Petty had worked with several orthopaedic companies and thought they saw some things the industry could do differently, and better. They wanted to make a difference in the quality of care provided to patients suffering from joint diseases like arthritis. In 1985, the Petty's and Dr. Miller made the first step toward realizing their vision by incorporating Exactech. Since that time, Exactech has leveraged its founding principles to become one of the world's fastest-growing orthopaedic companies. Patients in more than 35 countries around the world now benefit from Exactech's innovative solutions to joint replacement.

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It has often been said that the overall longevity of a total knee implant is attributed to the combination of excellent design and materials. Exactech's Optetrak® and Optetrak Logic® comprehensive knee systems were built on a strong design foundation, which began more than three decades ago. Developed from original technology licensed from the Hospital for Special Surgery (HSS) in New York, one of the leading orthopaedic research institutions, Exactech has evolved the implant lineage, which has continued to document excellent long-term implant performance and clinical outcomes.[1-2]

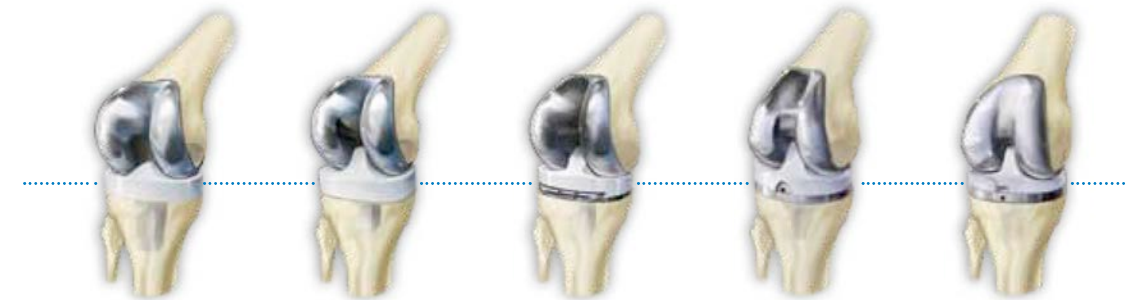
Evolution/Lineage

Under the close direction of Albert Burstein, Ph.D., the Optetrak design team and other clinical collaborators, in cooperation with HSS, began developing the Optetrak knee system in the early 1990s. Evolving from the Total Condylar (1974), Insall/Burstein (I/B) (1978), Insall/Burstein II (1988) and Optetrak (1994), Optetrak Logic represents the next generation of the clinically recognized knee system. The advancements in each successive design have been driven by improving and evolving previous designs, all while maintaining proven design principles *(Figure 1)*.

The Total Condylar prosthesis, developed by Drs. Peter Walker and John Insall, was first implanted at Hospital for Special Surgery in 1974 and is considered the first generation of today's modern implant design. The Total Condylar provided pain relief with good overall function, long-term clinical survival and range of motion of 90 degrees. This range of motion was adequate for walking (<90 degrees) but patients require greater range of motion for other daily activities such as rising from a chair and climbing stairs (90-120 degrees).

The I/B prosthesis, developed by Drs. Insall and Burstein and first implanted in 1978, evolved from the Total Condylar and demonstrated improved range of motion and stability. The prosthesis incorporated a femoral cam and tibial post designed to induce femoral rollback and allow patients a range of motion up to 115 degrees. The I/B II, introduced in 1988, expanded the scope of the original design to include modular tibial components and a constrained option, which allowed full modularity with stems and augmentation. While the I/B designs are recognized for clinical success, the patella tracking and the tibial locking mechanism were identified as areas for improvement.

Optetrak, introduced in 1994 and based on technology licensed from The Hospital for Special Surgery's patented HSS 913 design,



Total Condylar 1974 | **I/B I 1978** | **I/B II 1988** | **Optetrak 1994** | **Optetrak Logic 2009**

is a comprehensive knee system that includes cruciate retaining, posterior stabilized and constrained condylar options. The system builds on the clinical success of the I/B knees and was designed to optimize patella tracking, improve the tibial locking mechanism, reduce contact stress and provide range of motion to 125 degrees.

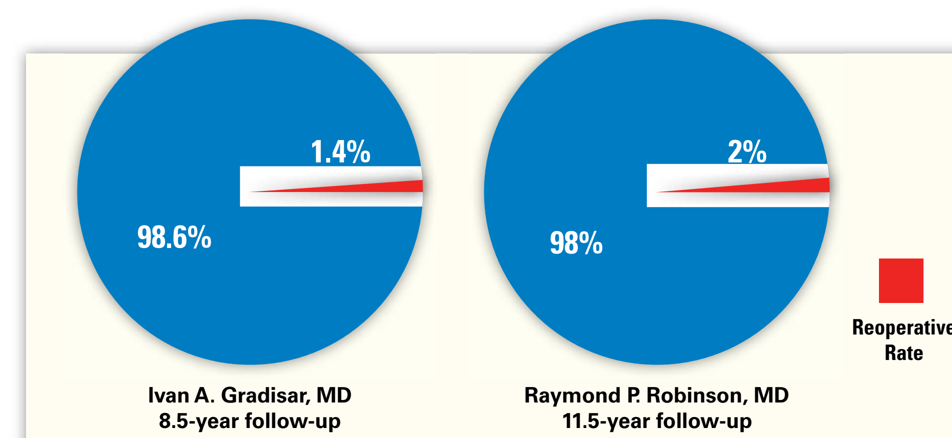
Optetrak Logic, introduced in 2009, continues the evolution of the Optetrak knee system, expanding the implant scope to include additional size and constraint options and updating the design to allow even greater range of motion.[1] Optetrak Logic introduces novel implants and instruments to make the total knee procedure easier, faster and more consistent;[2] improving patient satisfaction[3] for a more diverse population requiring total knee replacements.

Clinical Results

Guided by both clinical and laboratory data, the Optetrak lineage of implants has continued to demonstrate excellent long-term clinical outcomes.[4,5] The I/B knee has documented clinical survivorship of 92.4 percent at 19 years, which led Ayesha R. Abdeen and co-workers to conclude that the I/B design is a "prosthesis (that) is likely to outlive the patients."[6]

In a peer-reviewed study, led by Raymond Robinson MD, Optetrak demonstrated 98 percent implant survival rates in patients followed up to 15 years with a mean follow-up of 11.5.[4] In a study led by Ivan Gradisar MD, the Optetrak knee system showed a 98.6 percent implant survival rate at 8.5 years *(Figure 2)*.[5] With a design evolving for more than three decades and demonstrating excellent clinical[4,5] and laboratory results, surgeons and patients can have every confidence in the performance and longevity of the Optetrak knee system.

Figure 2: Published Clinical Results



Minimized Contact Stress

Total knee replacement longevity depends on a design that minimizes contact stress and the quality of materials. Optetrak Logic is designed to reduce contact stresses at the articular surfaces between the femoral and tibial components and lower the potential for surface damage and wear, ultimately improving the longevity of the prosthesis.

In total knee replacement designs, the bi-condylar contact between femoral and tibial components can be described by four major radii of curvature. These are critical in determining the congruency between the femoral and tibial components and associated contact stress and wear behavior *(Figure 3a).* In 1986, Donald Bartel discovered the optimum congruency for minimizing contact stress and optimizing kinematic performance *(Figure 3b).* Through his studies, Bartel observed, "The maximum contact stress was most sensitive to changes in the medial-lateral radius of the femoral and tibial components and much less sensitive to changes in the anterior-posterior radius of the components."[7] Careful consideration of these observations allowed the design team to optimize the geometric features of the Optetrak and Optetrak Logic knee implants for optimal long-term performance.

Figure 3a: Four Major Radii of Curvature

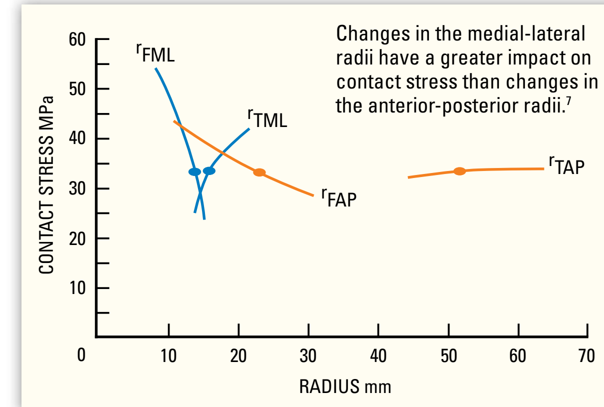


Figure 3b: Optimum Congruency for Minimizing Contact Stress

HSS applied the concept of full medial-lateral radius of curvature to the clinically successful I/B and I/B II knees and evolved the concept to create a new design, called HSS 913. Based on this new design, Optetrak increased the femoral and tibial medial-lateral congruency from 0.94 (I/B and I/B II) to 0.96, reducing contact stress by more than 20 percent *(Figure 4).*[7]

Optetrak Logic's full radius of curvature is centrally positioned for all sizes so that each condyle maintains this location for neutral, varus and valgus angulations of the joint *(Figure 5).* There is no thinning at the edges of the polyethylene, which is designed to eliminate edge loading and the associated polyethylene wear.

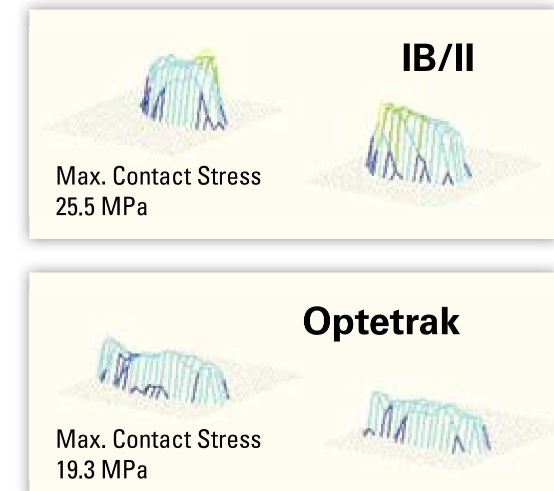


Figure 4: Optetrak Demonstrates Lower Contact Stress

Figure 5: Condyle Centrally Positioned for Varus/Valgus Angulations

In addition to reducing contact stress,[7] the implant is designed to allow the knee and surrounding ligaments and soft tissues to perform more naturally. The femoral and tibial articulating geometries are controlled to allow proper kinematic behavior of the knee joint, including internal and external rotation, translations and femoral rollback during flexion *(Figure 6)*.

Optetrak maintains its excellent congruency regardless of tibial sizing. The Optetrak Logic knee system matches the tibial insert size to the femoral component size to maintain the benefits of the ideal congruency between these components. For each femoral-tibial insert pair, there are three tibial tray sizes: same size, up-size and down-size *(Figure 7)*. This philosophy is different from most other knee systems that match the tibial insert to the tibial tray, which compromises the congruency and increases the potential for wear.

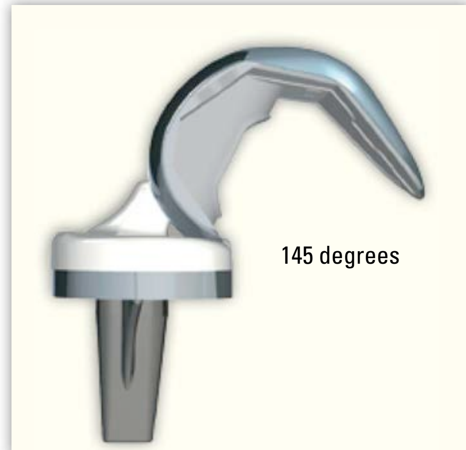


Figure 6: Femoral Rollback and A/P Translation

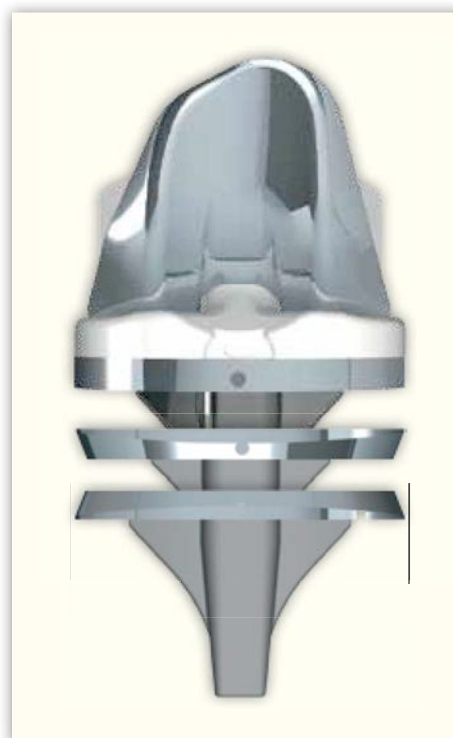


Figure 7: Tibial Up- and Down-sizing (Size 3 Femur, Size 3 Insert, and either Size 3, 2 or 4 Tibial Tray)

Enhanced Patella Tracking

From the earliest designs, surgeons have faced challenges with patella-femoral articulation. Incorporating improvements from the HSS lineage of implants, Optetrak Logic patella and femoral components are designed to allow natural patella tracking during flexion and extension by reducing contact stress, patella dislocation, patella clunk and retinacular strain.[8-10]

Optetrak Logic's hemispherical all-polyethylene patella allows for high congruency throughout range of motion, minimizing contact stress[7] with the trochlear geometry of the femoral component. The patella is designed for interchangeability where any size patella component is compatible with any given femoral component. As the patella diameter increases, so does the patella thickness allowing for proper tensioning of the patella-femoral joint *(Figure 8)*.

Continuing the improvements of the design lineage, Optetrak Logic features a deep femoral groove designed to reduce patella dislocation, subluxation and clunk. The deep groove widens superiorly providing less patella constraint to allow for excellent tracking. The debulked anterior femoral flange *(Figure 9)* and smooth geometry sagittal plane *(Figure 10)* is proven successful in significantly reducing tension in the lateral retinaculum resulting in a decreased incidence of lateral release.[8] In one study, Optetrak demonstrated excellent clinical results with up to a 77 percent reduction in retinacular releases *(Figure 11)*.[10]

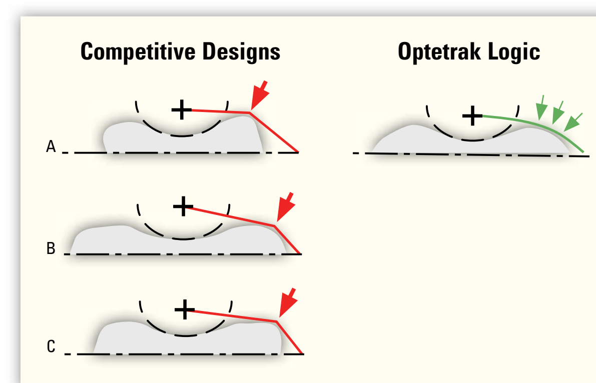


Figure 10: Smooth Sagittal Geometry

Figure 8: Hemispherical Patella

Figure 9: Debulked Anterior Flange

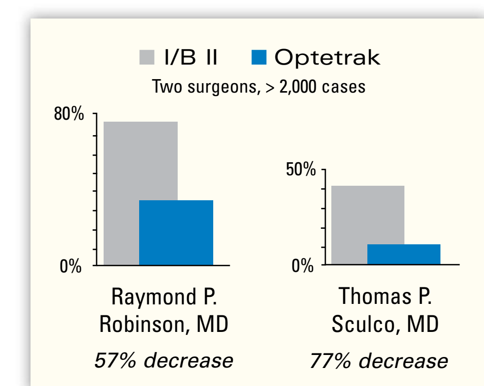


Figure 11: Decreased Lateral Release Rates[9-10]

Net Compression Molded Polyethylene

Total knee replacement longevity is a function of excellent design and proven materials. Optetrak Logic's articular geometry and net compression molded polyethylene inserts are designed to minimize surface damage and wear, ultimately improving the longevity of the knee prosthesis.

DESIGN

Wear can occur at the articulating surface between the femur and polyethylene insert (topside wear) and between the polyethylene insert and tibial tray (backside wear). It is important to recognize that topside and backside wear are different. Pitting and delamination are prevalent on the topside and abrasive wear on the backside. The relatively large topside wear particles are not as biologically reactive as the smaller backside wear particles that may increase the potential for osteolysis. Minimizing topside and backside wear is critical to increasing the longevity of the total knee prosthesis.

Optetrak Logic's wear performance is a result of controlling the implant design and managing the material properties of the polyethylene. The 0.96 congruency between the femur and insert and the minimum polyethylene thickness of 6.5mm are design elements that are optimized to reduce contact stress and minimize the potential for topside wear. Additionally, the three-part tibial locking mechanism is designed to eliminate micro motion and backside wear.

MATERIALS

Ultra high molecular weight polyethylene (UHMWPE) is the tibial bearing material used for most total knee replacement applications. The manufacturing, packaging and sterilization processes have a significant impact on the resulting properties of the final polyethylene component. Variations in consolidation, oxidation level, amount of cross-linking and mechanical properties can have a pronounced effect on the wear performance and longevity of the implant.

Consolidation is the process of converting polyethylene powder under controlled time, temperature and pressure, into a uniform solid. There are three methods for consolidation: ram extrusion, sheet compression molding and net compression molding (NCM).

The first two processes produce bar stock that is then machined into the final component. The third process, net compression molding, produces one insert at a time, with the articulation surface molded into the component. Exactech chooses the net compression molding to produce the Optetrak Logic tibial inserts because this process is proven to yield the most consistent consolidation, resulting in uniform material properties and oxidation resistance *(Figure 12)*.

The resulting articular surface of Optetrak Logic's NCM insert is never machined, creating a smooth finish free of machine lines. Precise machining is performed only on the non-articulating surface to create the overall thickness and precise details of the locking mechanism.

The properties of polyethylene can be manipulated through several post consolidation treatments, such as radiation, annealing and re-melting. These treatments have been used to improve the wear characteristics of some designs. The Optetrak lineage of implants, incorporating NCM, has demonstrated excellent wear characteristics through in vivo studies without requiring the need for post-consolidation treatments.[12]

The NCM inserts are sterilized in a vacuum package with gamma irradiation at 2.5-4 Mrad. At this sterilization dose, the level of cross-linking is limited. Although highly cross-linked polyethylene has been shown to increase abrasive wear resistance, it is documented to decrease fracture toughness.[13] Since the Optetrak tibial locking mechanism is proven to resist micro-motion and abrasive backside wear,[14] a high level of cross-linking is not necessary. By avoiding a high level of cross-linking, Optetrak Logic's NCM polyethylene tibial inserts retain oxidation resistance and fracture toughness, which, when combined with the articular design, has demonstrated excellent wear resistance on both the topside and backside.[15]

Extensive testing and clinical results demonstrate Optetrak's continued success in balancing the design and material properties to achieve optimized kinematics and wear characteristics. Optetrak has documented volumetric wear of 1.46 mg/MC.[11] This corresponds to an 83 percent reduction in wear rates and 52 percent less damaged area than the I/B II.[11] This is approximately six times less wear achieved without manipulating the properties of the clinically proven NCM polyethylene *(Figure 13)*.

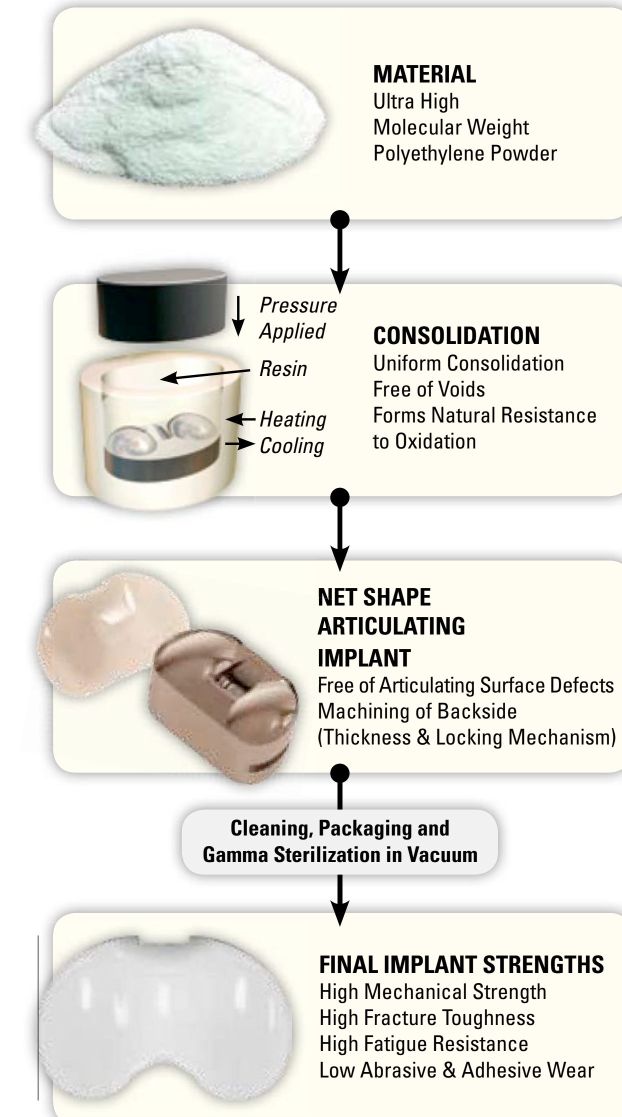
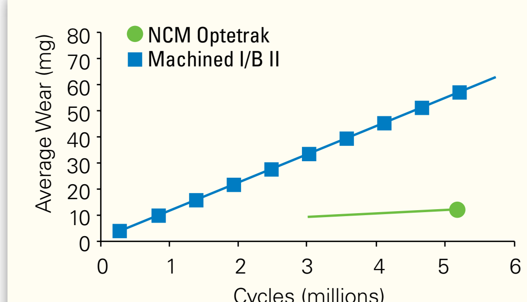


FIGURE 12: Manufacturing Process for NCM Polyethylene Inserts



Optetrak demonstrates 83% lower wear than I/B II.[11]

FIGURE 13: Low Wear Rates

Logic Tibial Options

Backside wear threatens the function and longevity of total knee replacements. Optetrak Logic tibial components are designed to minimize backside wear and provide rigid bone fixation while providing surgeons with flexibility to optimize tibial bone coverage and balance flexion/extension gaps.

Optetrak Logic Fit tibial trays feature a clinically successful locking mechanism that consists of three design elements:[14] a continuous peripheral rim, precision undercuts and a central mushroom designed to prevent backside wear and component disassociation. Tight manufacturing tolerances allow for a consistently secure fit between the polyethylene insert and tibial tray *(Figure 14)*. Through retrieval analysis and wear data, the locking features of the Optetrak system continue to provide confidence with proven results.

Optetrak Logic Fit tibial tray features a keel, which is proportional to the size of the proximal tibial coverage and is designed to maximize initial stability and provide a more anatomical fit. In addition, the keel geometry provides rotational constraint, tibial plateau support and the ability to add a stem extension for additional stability. The tray is designed with recessed features including cement undercuts and blind threaded holes that are designed toprovide improved cement fixation *(Figure 15)*.

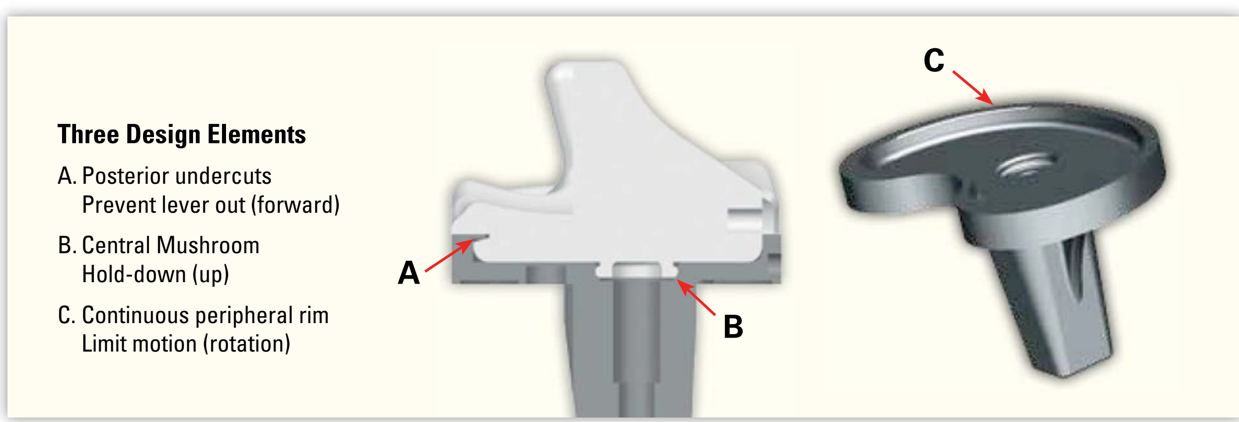


Figure 14: Tibial Locking Mechanism

Optetrak maintains its excellent congruency regardless of tibial sizing. The Optetrak Logic knee system matches the tibial insert size to the femoral component size to maintain the benefits of the ideal congruency between these components. For each femoral-tibial insert pair, there are three tibial tray sizes: same size, up-size and down-size *(Figure 16)*. This allows for optimal tibial bone coverage without increasing the stress and wear at the articulating surface.

A unique component of the Optetrak Logic system is Logic PTS (Proximal Tibial Spacer), a metal augment that fits between a tibial insert and tray and allows the use of standard inserts to balance larger flexion/extension gaps. The combination of Logic PTS and thinner inserts eliminates the need for thicker inserts. Since thinner insert thicknesses increase in smaller increments than thicker inserts (2mm vs. 4mm), Logic PTS combined with thinner inserts double the options available for managing larger gaps (2mm increments up to 23mm). Logic PTS also reduces the forces on the polyethylene locking mechanism by shortening the moment arm *(Figure 17)* which is designed to minimize motion at the locking mechanism.

The design of Logic PTS features the proven three-part locking mechanism[14] on the proximal surface that allows for a secure fit with all Logic CR, PS and PSC inserts. Similarly, the distal geometry of Logic PTS is designed to engage with the locking mechanism on the proximal surface of the Logic Fit tibial tray.

FIGURE 15: Keel on the Tibial Fit Tray

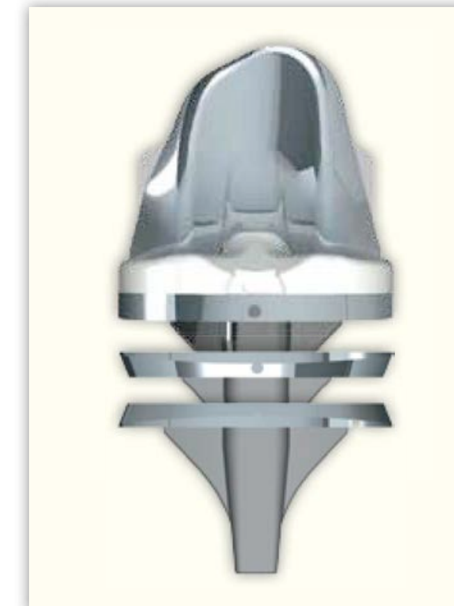


Figure 16: Tibial Up- and Down-sizing (Size 3 Femur, Size 3 Insert, and either Size 3, 2 or 4 Tibial Tray)

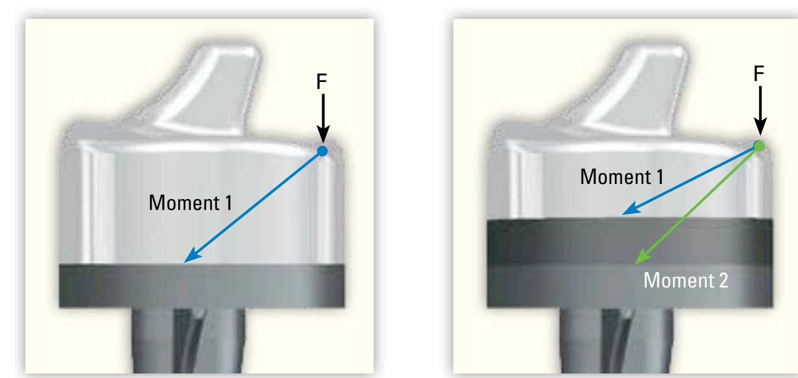
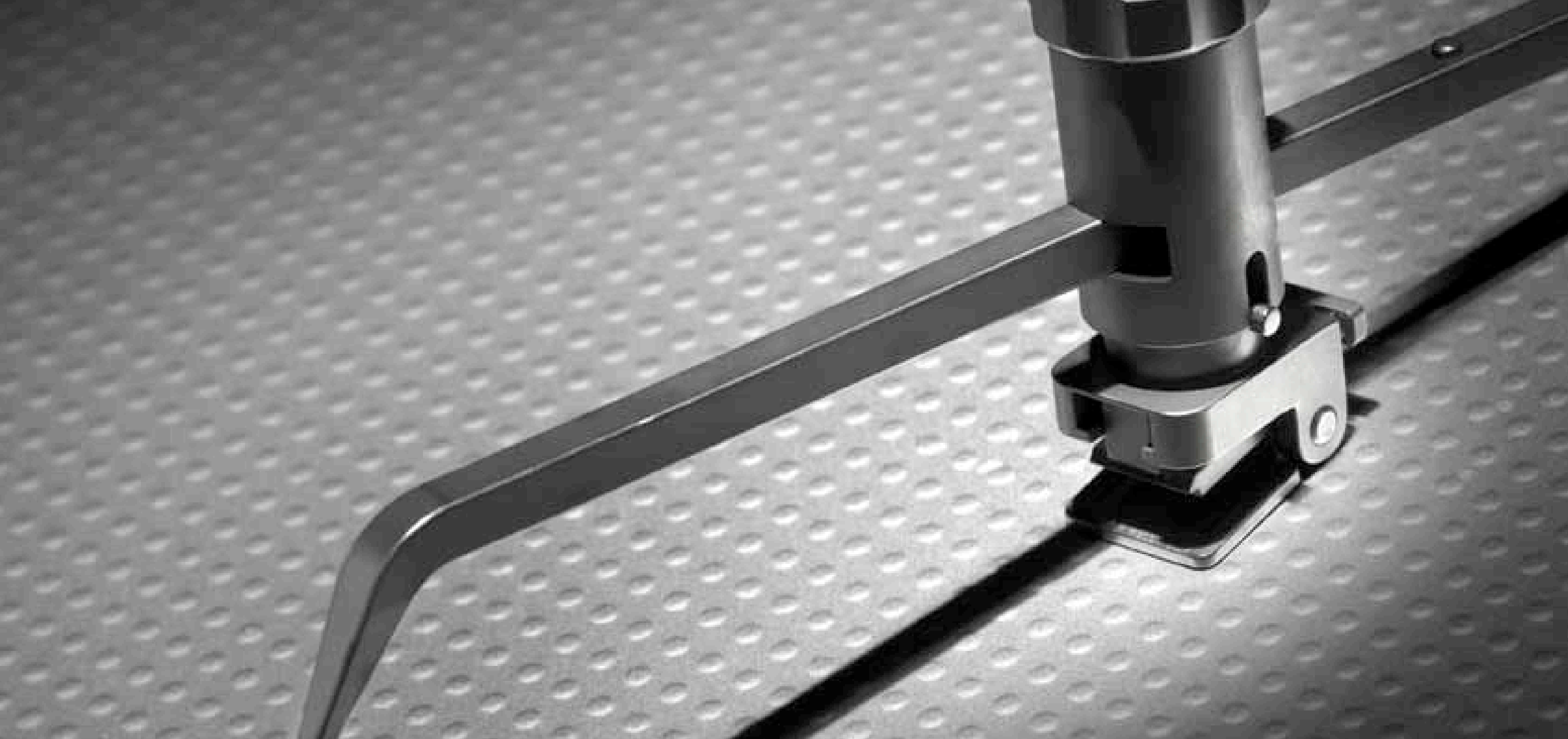


Figure 17: Proximal Tibial Spacer Reduced Forces



Logic CR

One of the major challenges in cruciate retaining (CR) total knee arthroplasty is to maintain the PCL during surgery, both structurally and kinematically.[16] Built to consistently identify and preserve the PCL, re-establish the normal joint line and avoid additional bone resections and ligament releases, Optetrak Logic CR is designed to provide predictable and reproducible post-operative joint kinematics and improved patient satisfaction.

Achieving a well-balanced flexion/extension gap for a CR prosthesis requires accurate resections of the distal femur, posterior femur, proximal tibia and tibial anterior-posterior (AP) slope. Among these four factors, the tibial AP slope is the most challenging because there is no clear anatomical landmark to reference. As a result, an unbalanced flexion/extension gap is often observed after the initial bone resection in a CR surgery, requiring additional manipulations to adjust the flexion gap.[13,16] Traditional approaches to achieve this adjustment include resecting additional posterior femoral bone, increasing the slope of the proximal tibial resection and/or recessing the PCL. These approaches take additional operative time, can increase intra-operative trauma and may also compromise PCL function and patient outcomes.

Optetrak Logic CR offers an alternative to the traditional approach of preparing the tibia that saves time, avoids additional intra-operative trauma and focuses on preserving the function of the PCL.[3] In most traditional CR tibial resection systems, tibial resection depth is determined by referencing the medial or lateral tibial plateau. Due to the variability of PCL insertion position in different patients, this approach is likely to compromise the integrity of the PCL.[16]

A study conducted by the Optetrak design team revealed that the PCL insertion point to the tibia could be consistently identified and measured over a variety of knee sizes and geometries *(Figure 18)*. If this insertion point is used as a reference for the proximal tibial resection, a natural slope tibial cut (A) would yield insufficient joint space (less than 9mm) for the tibial components. The additional tibial resection necessary to increase the joint space (B) would likely compromise the integrity of the PCL. However, a more neutral slope tibial cut (C) is more likely to yield the appropriate joint space without compromising the integrity of the PCL.[3,17]

Motivated by the goal to "consistently identify and preserve the PCL," a new method for determining the tibial resection, the Posterior Cruciate Referencing Technique (PCRT) was established for Optetrak Logic CR. Rather than referencing the tibial plateau to establish the proximal tibial resection, the PCRT references the insertion of the PCL to the posterior tibia *(Figure 19)*. A No-Touch PCL Retractor is designed to sublux the joint in flexion without damaging the PCL. An elongated tibial stylus was developed to establish tibial resection depth based on the location of the PCL footprint rather than the tibial plateau. When combined with a more neutral tibial slope resection (between 0 and 3 degrees), the instruments allow surgeons to preserve the integrity of the PCL attachment while taking a less aggressive tibial resection.

A: natural slope tibial cut, preserved PCL insertion

B: natural slope tibial cut, compromised PCL insertion

C: neutral slope tibial cut, preserved PCL insertion.

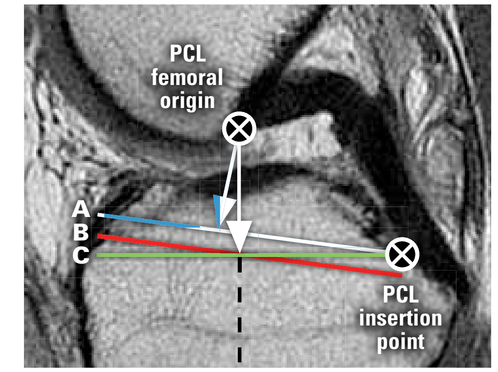


Figure 18: MRI Study[17]

Adjustments to the flexion gap may be necessary since the tibial resection is based on the insertion of the PCL rather than a fixed depth from the proximal tibia. With Optetrak Logic CR, it is now possible to adjust the flexion gap independently from the extension gap without having to recut the proximal tibia, downsizing the femur or releasing the fibers of the PCL. Surgeons now have the flexibility with insert trials to evaluate the effects of an additional three or six degrees of tibial slope built into the insert *(Table 1)*.

The sloped tibial options are offered up to 13mm; beyond this it is unlikely that the PCL is still functional, and it may be necessary to convert to a more constrained implant option.[17] To convert to Optetrak Logic PS, all that is required is the femoral notch resection. The femoral anterior and posterior resections and the tibial resection do not change.

Figure 19: Posterior Cruciate Referencing Technique

	Tight Extension	Loose Extension	OK Extension
Tight Flexion	• Use a thinner Logic CR **Neutral** Tibial Insert Trial if possible • Cut additional tibia, respecting the PCL insertion • Recess the PCL fibers respecting the PCL footprint	• Increase insert thickness and trial with Logic CR **Slope+ or Slope++** Tibial Insert Trials • Downsize femoral component • Recess the PCL fibers respecting the PCL footprint	• Trial with Logic CR **Slope+ or Slope++** Tibial Insert Trials of the same thickness • Downsize femoral component • If trialed with Slope++ and flexion gap is still tight, convert to Logic PS
Loose Flexion	• Resect additional distal femoral bone and use a thicker Logic CR **Neutral** Tibial Insert Trial • Verify integrity of the PCL if the **Neutral** Tibial Insert Trial is thicker than **13mm**	• Use a thicker Logic CR **Neutral** Tibial Insert Trial • Verify integrity of the PCL if the **Neutral** Tibial Insert Trial is thicker than **13mm**	• Resect additional distal femoral bone and use a thicker Logic CR **Neutral** Tibial Insert Trial • Verify integrity of the PCL if the **Neutral** Tibial Insert Trial is thicker than **13mm**
OK Flexion	• Resect additional distal femoral bone	• Increase insert thickness and trial with Logic CR **Slope+ or Slope++** Tibial Insert Trials	

Note: Some studies reported that an additional degree of insert slope on average increases peak flexion by 1.5 degrees to 1.7 degrees[18]

Table 1: Flexion/Extension Gap Balancing

Logic PS

Optetrak Logic PS is designed to maximize stability and range of motion while providing surgeons an easier, faster and more consistent notch preparation with the goal of more consistent patient outcomes.

Optetrak Logic PS features an optimized femoral cam/tibial spine mechanism designed to replicate normal femoral rollback while improving joint stability and dislocation resistance. The articulating geometries of the femoral and tibial components, along with soft tissues and the remaining collateral ligaments, provide anterior-posterior stability to approximately 75 degrees of flexion *(Figure 20a)*, at which point the femoral cam and tibial spine begin to engage to provide controlled rollback for maximum range of motion to 145 degrees *(Figure 20b)*.

The tibial insert incorporates a concavity posterior to the spine, which lowers the initial engagement of the femoral cam with the tibial spine and increases the jumping height without increasing the overall height of the spine *(Figure 21)*. The cam engages with the spine near 75 degrees of flexion and is designed to minimize stress to the tibial locking mechanism and tibial bone interface. Furthermore, the posterior angle of the spine is intended not only to facilitate femoral rollback but to also improve femoral dislocation resistance.

The dimension of the femoral notch and tibial spine are proportional to the size of the femoral component, minimizing the bone resection for smaller sizes and increase the jumping height for larger sizes. The tibial spine also features a large cross-sectional area and large base, designed to resist higher shear loads imposed on the spine during deep flexion.

Figure 20a: Logic PS in Extension

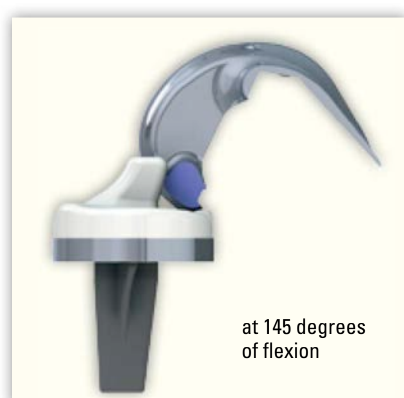


Figure 20b: Logic PS Spine/Cam Interaction

Figure 21: Logic Hi-Flex Spine/Cam Mechanism

Optetrak Logic PS tibial inserts feature a large anterior relief and slope on the anterior of the insert spine, which is designed to minimize stress and irritation to the patella tendon during high flexion *(Figure 22)*. Additionally, posterior scallops on the tibial insert were designed to reduce potential for impingement and maximize range of motion.

During high flexion angles and significant internal/external rotation of the femur relative to the tibia, one condyle may move off the posterior edge of the tibial component *(Figure 23)*. At this point, the Optetrak Logic PS femoral cam is designed to act like a "third condyle" and transmit load to a patented secondary bearing surface. This secondary bearing feature is designed to minimize contact stress and maintain varus/valgus stability at extreme range of motion.

A "bowtie" deformation pattern is sometimes observed on the anterior face of the tibial spine on traditional posterior-stabilized knee implant retrievals, which may be due to stresses placed on the corners of the spine during internal/external rotation and hyperextension. The patented Optetrak Logic PS anterior tibial spine and anterior femoral cam features a rounded geometry designed for a more congruent contact during internal/external rotation and hyperextension. This design reduces the potential for deformation of the anterior tibial spine and also allows for increased axial rotation throughout the range of motion *(Figure 24)*.[1]

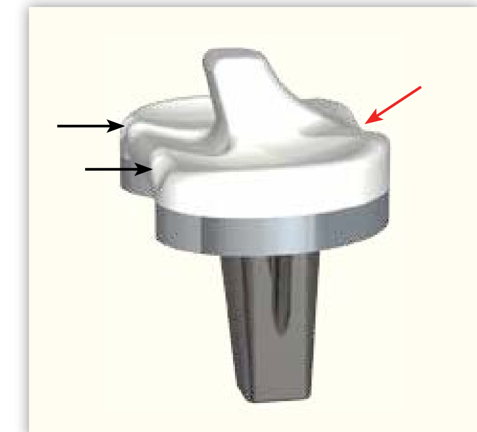


Figure 22: Anterior Geometry and Posterior Scallops

Figure 23: Femoral Cam Transmits Load

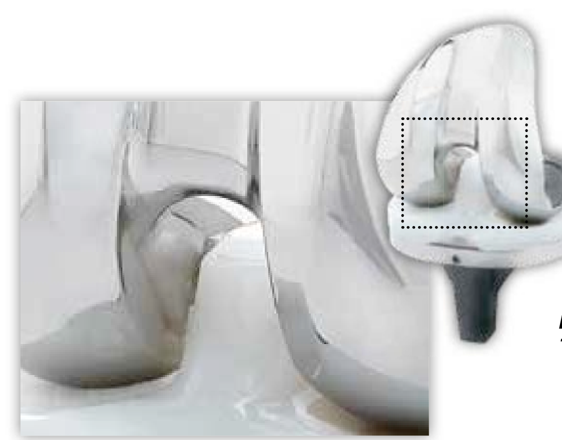


Figure 24: Rounded Anterior Tibial Spine and Femoral Cam

A common concern for surgeons is posterior stabilized designs require too much bone resection for the PS box, and the preparation could lead to stress concentrations and possible intercondylar fractures. Optetrak Logic PS addresses these concerns by removing less bone and simplifying the notch preparation.[2]

The notch resection required for Optetrak Logic PS removes 30 percent less bone than traditional PS designs.[2] This minimized resection is achieved by shifting the anterior position of the resection distally and by changing the shape from a traditional "box" to "dome" geometry *(Figure 25)*. The new design not only preserves bone but also eliminates the potential for stress concentrations at the 90 degree intersections of a traditional box resection.[2]

Optetrak Logic PS simplifies the notch resection by providing a notch guide that constrains the angle and depth of the re-usable cylindrical notch cutter *(Figure 26)* making the preparation less sensitive to variations in surgical technique. The notch guide and cutter are proportional to the size of the femoral component. The outer profile of the guide mirrors that of the femoral component allowing more accurate medial-lateral placement of the notch resection compared to traditional resections.

Optetrak Logic PS inserts are designed to allow soft tissues and the remaining collateral ligaments to contribute to varus/valgus stability of the knee. However, when the function of the ligaments is compromised and additional constraint is desired from the implant, Logic PSC inserts are available. Logic PSC and Logic PS are identical except for the width of the tibial spine, which allows PSC to constrain internal/external rotation to four degrees and varus/valgus motion to three degrees *(Figure 27)*. The Logic PS insert is designed for less constrained rotational and varus/valgus motions. Both insert designs are compatible with the Logic PS femoral components.

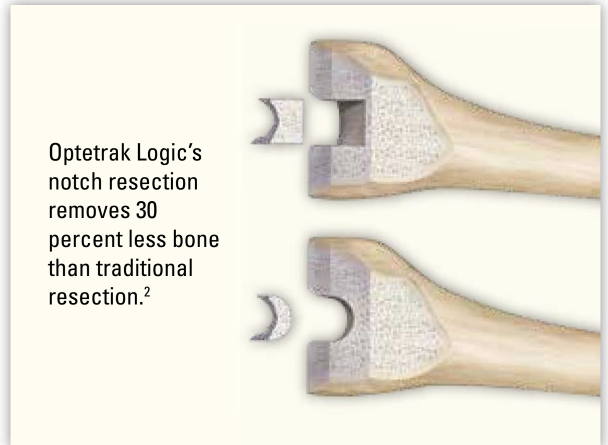


Figure 25: Logic Notch Resection

Figure 26: Logic PS Notch Cutting Guide

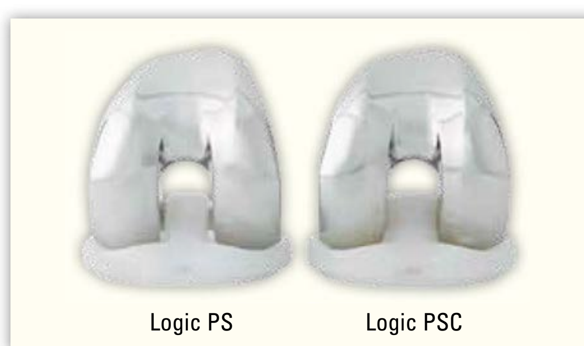


FIGURE 27: Logic PSC Inserts

Comprehensive Knee System

Optetrak Logic's design accommodates multiple surgeon philosophies and patient anatomies, providing many options for consistency and reproducibility with an easy-to-use, intuitive system of implants and instrumentation.

The Optetrak Logic system offers 10 femoral sizes and 28 tibial tray sizes designed to optimize femoral and tibial coverage. Logic CR offers unique instruments and three sloped tibial insert options designed to consistently identify, preserve and balance the PCL. Logic PS simplifies the notch resection, preserves more bone[2] and allows for greater range of motion,[1] and Logic PSC provides an easy solution for ligamentous instability. Continuing the implant system evolution, Logic offers more sizes, more implant options and more constraint options to address the needs of more patients and surgeon preferences.

Optetrak Logic's Low Profile Instrumentation (LPI®) provides a new level of efficiency for the operating room. The system of user-friendly instruments features an innovative layout that organizes the instruments with the surgeon's technique in mind and a modular case design that reduces the number of required instruments. Trials and other instruments are grouped by size in modular half trays, enabling instruments to be customized for a specific patient *(Figure 28)*. This should not only improve operating room efficiency, but the reduction in the quantity of instruments reduces instrument sterilization and processing costs.

Figure 28: Customizable Instrument Trays

References

1. US patent 6730128, Albert H Burstein, "Prosthetic Knee Joint," issued 2004-05-04
2. Data of file at Exactech. 051K. Intercondylar Femoral Notch Preparation for Posterior Stabilized Knee Arthroplasty – Volumetric Bone Resection According to Two Methods.
3. **Covall, David J. MD; Stulberg, Bernard N. MD; Mabrey, Jay MD; Burstein, Albert H. PhD; Angibaud, Laurent D. BS; Smith, Keisha BS; Zadzilka, Jayson D. MS.** Introducing a new technique for improving predictability in cruciate-retaining total knee arthroplasty: the Posterior Cruciate Referencing Technique. *Techniques in Knee Surgery:* December 2009 -Volume 8 - Issue 4 - pp 271-275.
4. **Robinson RP, Green TM.** Eleven-year implant survival rates of the all-polyethylene and metal-backed modular Optetrak posterior stabilized knee in bilateral simultaneous cases. *J Arthroplasty.* 2011 Dec;26(8):1165-9.
5. **Edwards J, Gradisar I Jr, Nadaud M, Kovacik M, Askey M.** Eight and one-half year clinical experience with the Optetrak total knee prosthesis. Presented at the American Academy of Orthopaedic Surgeons. February 2004.
6. **Abdeen AR, Collen SR, Vince KG.** Fifteen-year to 19-year follow-up of the Insall-Burstein-1 total knee arthroplasty. *J Arthroplasty.* 2010 Feb;25(2):173-8.
7. **Bartel DL, Bicknell VL, Wright TM.** The Effect of Conformity, Thickness, and Material on Stresses in Ultra-High Molecular Weight Components for Total Joint Replacement. *J Bone Joint Surg* 1986;68-A(7):1041-1051.
8. **Petty RW.** Caveats in patello-femoral design. Presented at the 10th Annual Meeting, Current Concepts in Joint Replacement,Orlando, FL. 1994.
9. **Robinson RP.** Comparison of clinical results of the third, fourth,and fifth generations of the Hospital for Special Surgery prosthetic knee implant. Presented at the Pennsylvania Orthopaedic Society, Fall 1999. Farmington, PA.
10. **Sculco TP.** The significance of patellar clunk: how loud the sound! Presented at Current Concepts in Joint Replacement, Winter 1999.
11. **Furman, B.D., Bhattacharyya, S., Li, S.** A Comparison of Degradation of UHMWPE for Shelf Aged and Implanted UHMWPE Components. Trans. 27th Ann. Meeting Soc. Biomaterials, 459, 2001.
12. **Abdeen AR, Collen SR, Vince KG.** Fifteen-year to 19-year follow-up of the Insall-Burstein-1 total knee arthroplasty. *J Arthroplasty*. 2010 Feb;25(2):173-8. Epub 2009 Feb 5.
13. **Lachiewicz PF, Geyer MR.** The use of highly cross-linked polyethylene in total knee arthroplasty. *Journal of the American Academy of Orthopaedic Surgeons.* 2011 Mar;19(3): 143-51.
14. **Jayabalan P, Furman B, Cottrell J, Wright T.** Backside wear in modern total knee design. *HSSJ.* 2007;3:30-4.
15. **Li S, Burstein AH.** Ultra-high molecular weight polyethylene: the material and its use in joint implants. *J Bone Joint Surg Am.* 1994 Jul;76(7):1080-90.
16. **Shannon et al.,** The posterior cruciate ligament-preserving total knee replacement: do we 'preserve' it? A radiological study. *J Bone Joint Surg Br.* 2007 Jun;89(6):766-71.
17. Data on file at Exactech, Inc.
18. **Bellemans J, Robijns F, Duerinckx J, Banks S, Vandenneucker H.** The influence of tibial slope on maximal flexion after total knee arthroplasty. *Knee Surgical Sports Traumatol Arthroscopy*. (2005) 13: 193–196.

U.S. patents 5,732,992; 5,688,281; 5,910,143; 6,193,723 B; 5,725,580; 4,928,992; 5,702,458. Additional U.S. and foreign patents pending.

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