Success of cementless femoral revision arthroplasty is dependent on achieving initial prosthetic stability. The challenge for the revision surgeon is to find the best method to secure the implant in a femur with deficient proximal bone while providing for initial axial and torsional stability.

Extensively porous-coated femoral implants such as the Solution System® hip provide a reliable method to gain immediate and rigid fixation of the prosthesis. Tissue ingrowth is achieved through intimate contact between the implant’s porous surface and the available well-vascularized and structurally sound host bone. Predictable osteointegration has been associated with long-term stability and pain-free function.\(^1\)

Extensively porous-coated implants also provide an option to bypass the damaged metaphyseal femur and rely on the strength, shape and tissue ingrowth capabilities of the undisturbed distal femur. The cylindrical distal shape of the prosthesis allows the machined tubular shape of the femoral diaphysis to be filled, providing a greater area of predictable implant-to-bone interface. This allows the technique of distal fixation to be used predictably in virtually all revision situations. This versatility is particularly important because bone damage can sometimes be difficult to evaluate on preoperative radiographs, and bone stock may further be compromised after the removal of the failed implant and/or the cement.

**HISTORICAL PERSPECTIVE**

In 1977, Dr. Charles Engh began utilizing a modified Austin-Moore straight-stemmed, porous-coated femoral component. The prosthesis was made of cast cobalt-chromium with a powder-made, sintered, beaded surface of the same material. The initial pore size was 100 µm. In 1980, based on animal research, the pore size was increased to a mean of 250 µm. In 1982, the first 100 cases were presented to the Food and Drug Administration and the implant was approved for use without cement in primary hip arthroplasty. In 1983, the Anatomic Medullary Locking (AML®) stem was made available in distal stem diameters ranging from 9.0 – 21.5 mm, in 1.5 mm increments. Increasing use of the stem led to the recognition of proximal/distal sizing mismatch in the femur. This, therefore, prompted the development of a second stem with reduced medial to lateral dimension (Modified Medial
Long-term success of the extensively coated implant is best assessed radiographically. Engh, et al., observed the changes that occur between one and three years postoperatively. Engh characterized bone ingrowth fixation by absence of implant migration, absence of radiolucent lines around the porous portion of the stem, absence of endosteal hypertrophy at the distal limit of the porous coating and no pedestal formation. Clear radiographic evidence of bone ingrowth has been well-documented in postoperative review of cases utilizing the Solution System hip. Paprosky, et al., reported on a series of 170 cementless revision arthroplasties at a mean follow-up of 13.2 years with 95 percent “excellent results” utilizing the Solution System hip.

The Solution System Revision Hip System is a comprehensive, dedicated revision system comprised of implants and instruments to address bone loss ranging from mild to severe. The stem's symmetrical shape makes femoral preparation and implantation a straightforward procedure, helping to consistently reproduce successful, long-term clinical results in even the most demanding revision cases.

Aspect). This series of changes allowed for improved canal filling, both proximally and distally.

Increasing experience with revision surgery led to the recognition of the fact that, in the presence of significant damage to the proximal femur, fixation of the stem could be reliably achieved at a more distal level. In 1989, the Solution System design was introduced based upon 20 years of clinical experience using extensively coated cementless implants. The Solution System Revision Hip System provided longer, extensively coated stems up to 250 mm (10 in.) in length. Further refinements included the addition of bowed calcar replacement prosthesis, as well as reduced neck and taper geometries for improved range of motion. Long-term clinical performance continues to be well-documented in peer-reviewed journals.
A consistent preoperative planning routine is important for all total hip arthroplasties. This is especially true for revision cases. Major goals of the preoperative planning process include:

**For Type 1 Defects**  Determine the length and diameter of the implant to be used and whether a small or large stature implant will be needed.

**For Type 2 Defects** In addition to the considerations given to a Type 1, preoperative planning for a Type 2 defect must also determine whether a bowed or calcar implant may be appropriate.

**For Type 3A and 3B Defects** Is 4–6 cm of scratch-fit available at or below the isthmus? Will a calcar or bowed stem be used?

**For Type 4 Defects** What form of alternate fixation will be employed? What surgical approach will provide the best exposure?

Take anterior/posterior (A/P) X-rays of both the affected and unaffected femurs to determine the amount of bone loss proximally and distally. These X-rays may also show if the femoral component has migrated. Look for osteolysis of the femur and/or the amount of cement present.

Assess progressive radiolucencies by comparing these films with the radiographs taken immediately following primary surgery. Femoral stem loosening is indicated by divergent radiolucent lines that envelop the prosthesis and/or distal migration of the prosthesis, accompanied by shifting in the position of the femoral component.

Assess various deformities in the femur to determine the necessary diameter of the femoral component. Assess bone stock in the metaphysis, as well as the diaphysis to determine if canal fill can be achieved with an extensively porous-coated device.

Obtain a Lowenstein lateral of the entire femur by positioning the patient on his/her side, supporting the opposite hip so that the lateral aspect of the involved hip lies flat on the X-ray table.

A true lateral is important in assessing the curvature of the femur. When a longer straight stem is selected to achieve maximum distal canal fill in the diaphysis, the potential for perforation of the anterior femoral cortex is much greater. By obtaining accurate lateral films, the maximum diameter of a long straight stem can be determined by templating it against the curvature of the femur.

Use the A/P pelvis radiograph and clinical evaluation to assess leg length discrepancy. Use leg length discrepancy to determine whether extra-long neck segments will be required to restore leg length.
Appropriate preoperative patient evaluation and radiographic analysis can assist with optimal implant selection. DePuy’s revision platform provides a simple defect classification, which allows the surgeon to identify the femoral deficiencies, then establish the appropriate procedures and the type of implant to be used.
Once the cement, neocortex and pedestal have been removed, begin reaming. Use rigid reamers with straight stems and thin-shaft reamers with bowed stems. Determine the length of reaming by noting the length of stem necessary to restore the biomechanics of the hip. Ensure a minimum of 4–6 cm of “scratch-fit” can be achieved below the level of the defect. Perform reaming in a neutral alignment and start laterally to avoid impingement from the greater trochanter.

Reaming should progress until good endosteal cortical contact is obtained. Under-ream the femoral canal by .5 mm when the rigid reamers are used for straight stems. If thin-shaft reamers are indicated, ream line-to-line or .5 mm over the bowed stem diameter. The use of trial stems will help make that determination.

Depending on the defect, use a broach as a trial to determine version and length. Broaches are typically used in Type 1 and Type 2 femoral defects. It may be necessary to prepare the medial endosteal femur with a high-speed, low-torque burr before seating the broach. If the proximal femur is too tight to allow seating of the large stature broach, a small stature broach should be used.
When using a parallel-sided implant such as the Solution System hip, use trial stems to gauge where the stem should seat to restore biomechanics. The trial stem is sized 1.5 mm less than the stem diameter to allow for insertion, removal and adjustments.

Use trials to indicate where alterations of the component position need to be made. Monolithic trials are typically used for 8-, 9- and 10-in. stems to help assess hip stability.

When the trial is in place, put the hip through a range of motion to assess its stability. If the hip is unstable, evaluate the neck length, version, prosthesis height, head size, trochanteric position, soft tissue impingement and bony impingement, as well as the orientation of the cup. Make adjustments to components as needed.

Ideally, the femoral canal should be underreamed by .5 mm to ensure a “scratch-fit” of the porous coating. When using an osteotomy, perform prophylactic wiring of the shaft, just distal to the osteotomy, prior to implanting the stem.

Insert the stem by hand. If a straight stem is indicated, the implant should sit proud, typically 4–6 cm above its seating point. If a bowed stem is indicated, note where the trial stem turned during insertion. Use the Excel driver to fully seat the component.

If an osteotomy is indicated, insert the revision prosthesis and shape the osteotomy fragment with a burr to fit over the lateral shoulder of the prosthesis. Secure the fragment with multiple Control™ cables or wires. To fine-tune the fragment position, place the hip through a range of motion prior to crimping the cables.
GENERAL CONSIDERATIONS
Since the Type 1 femoral defect still has significant calcar support and the anterior and posterior metaphysis are intact, the new 6-in. AML extensively coated stems are typically indicated.

REAMING
Perform lateralized exposure of the proximal femur using a high-speed burr. This is similar to primary surgery where the piriformis fossa is used for the pilot hole. Use rigid intramedullary reamers to ream the intramedullary canal (Figure 1). The final reaming of the diaphysis is generally .5 mm less than the diameter of the extensively coated stem. For example, if a 13.5 mm stem provides the optimal fit then final reaming should be performed with the 13 mm standard reamer. This will allow for .5 mm circumferential press-fit.

BROACHING
Preoperative templating should indicate whether a large or small stature broach is to be employed. If in doubt, begin broaching using the small stature broach. As the broach is seated, pay careful attention to medial and lateral contact (Figures 2 and 3). Keep in mind, full seating of the broach is not necessary for distal fixation.

When the broach stops advancing, fixation has been gained proximally as well as distally. Even though the broach advances a little more distally than it does in primary surgery, the anterior bow of the femur will, more than likely, not cause impingement of the advanced broach. Now perform a trial reduction using the seated broach to determine stability.

FEMORAL CONDITION
- The calcar region is supportive.
- Minor cancellous bone loss exists anterior/posterior; the metaphysis is intact.
- The diaphysis is intact.

Figure 1
STANDARD INTRAMEDULLARY REAMING
If the hip is unstable with the small stature broach, use a large stature broach. The large stature broach will seat itself in a stable position against rotational forces proximally more so than the small stature broach. The decision to use a large or a small stature broach depends upon which broach gives the most stability in the proximal femur against rotation and provides postreduction stability.

**TRIALING/IMPLANTATION**

Follow the basic procedure outlined earlier.

Grafting is rarely necessary in Type 1 defects. There is only a minimal increase in A/P diameter of the calcar region due to osteolysis and this may be filled with particulate graft, if necessary.
GENERAL CONSIDERATIONS
Due to more extensive metaphyseal bone loss than in a Type 1 defect and the absence of greater amounts of bone superior to the lesser trochanter, reaming and the insertion of the broach and prosthetic component are further distal. Because of this, pay particular attention to the resistance encountered from the anterior bow of the femur. An 8-in. straight stem is typically used, but an 8-in. bowed stem or 8-in. calcar replacement are optional, if necessary.

REAMING FOR A STRAIGHT STEM
For a Type 2 femoral defect, the style of reamers used depends upon the type of stem that will be implanted. In most Type 2 femurs, an AML 6-in., a Solution System straight 8-in. or 8-in. calcar stem is typically used. If a straight stem will be used, begin reaming using the standard Solution System reamers (Figure 4).

Advance the reamers distally approximately 6 inches. The collar of the prosthesis will therefore seat on the lesser trochanter at a distance of 6 inches proximal to the tip of the reamer. Ream with progressively larger reamers until cortical scratch-fit is established over 4 – 6 cm for the final implant. It is recommended to under-ream by .5 mm when using standard reamers. If maximum canal fill can be achieved at this depth, a straight stem can be used.

The noncoated, parabolic tip of the Solution System hip provides forgiveness as the stem advances distally, allowing the surgeon to match the size of the implant to the size of the last reamer used. This helps ensure maximum fit and fill.

If maximum fill cannot be achieved above the level of the femoral bow, consider using an 8-in. bowed stem.

FEMORAL CONDITION
- The calcar region is nonsupportive.
- Cancellous/cortical structural bone is absent; the metaphysis is not intact.
- The diaphysis has minimal damage.
Confirm the position of the reamer or the trial by using intraoperative A/P and lateral X-rays of the femur. The intraoperative X-ray evaluation is recommended because it helps determine which femoral component will maximally fill the canal and how far distally a straight component can advance before the use of a bowed component becomes necessary. If intraoperative X-rays confirm that maximum canal fill cannot be achieved at this depth, continue reaming using the thin-shaft reamers to avoid impingement caused by the bow of the femur (Figure 5).

**FOR A BOWED STEM**

If the decision to use a bowed stem is made preoperatively, begin reaming using the thin-shaft reamers (Figure 5). Perforation of the anterior cortex can be avoided by using the thin-shaft reamers. This is due to the design of the thin-shaft reamer, which allows the cutting tip of the reamer to advance distally while remaining centered in the medullary canal. The cutting tip remains centered since the thin shaft avoids deflection by the cortical wall while remaining well clear of any proximal bone stock or bony defects. Therefore the reamer encounters only resistance from the entire circumference of the medullary canal as it reams straight down the canal.

Regardless of whether the decision to use a bowed stem is made preoperatively or intraoperatively, ream with progressively larger thin-shaft reamers until the reamer encounters resistance over 4–6 cm. Be sure to over-ream by .5 mm when using thin-shaft reamers, as this will ease insertion of the bowed stem during final implantation.

Before implantation, corresponding rigid reamers may be employed to establish optimal lateralization of the femoral endosteum. Take care to avoid reaming to the level of the anterior bow, thus avoiding cortical perforation. At this point, the implant with the corresponding diameter will give maximum canal fill.
**BROACHING**

Next, determine whether a small stature or large stature component is to be used. Insert the appropriate size small stature broach, determined by the diameter of the diaphyseal portion of the component that maximally fills the femoral canal. If the small stature broach fills the proximal femur and is stable against rotation at the level of the lesser trochanter, perform a trial reduction (Figures 6 and 7). If the trial reduction is stable, then select the corresponding femoral component. If the small stature stem does not fill the proximal femur at the level of the lesser trochanter and is unstable against rotational forces, then use a corresponding large stature implant.

Figure 6
**BROACH: A/P VIEW**

Figure 7
**BROACH: M/L VIEW**
TRIALING/IMPLANTATION

If maximum fill cannot be achieved at this distance without impingement against the anterior cortex, use a bowed stem. The need for a bowed 8-in. stem is more common for Type 3A and Type 3B defects.

If substantial calcar bone is absent or was removed during explantation, use the appropriate 8-in. straight calcar stem. This system has a proximal calcar platform of 1.5 cm in length. The stem length is 8 inches; therefore, approximately 2 inches is the maximum distal advancement beyond that of a 6-in. stem. The design of the 8-in. calcar stem resists impingement against the anterior femoral cortex. This can be confirmed with an intraoperative X-ray.

When treating a Type 2 femoral defect, proximal bone loss and leg length discrepancy often require that the component be inserted in a proud position. While this will correct leg length discrepancy, femoral offset, high hip centers and anteversion, it may also result in less distal fixation being achieved in the femoral canal.

The Solution System hip addresses this issue. Its parallel-sided, cylindrical design allows it to be raised, lowered and rotated in the canal and still achieve 4 – 6 cm of scratch-fit (Figure 8). Consistent fixation can be achieved because the canal created by the Solution System reamers measures the same diameter at any given point, thereby creating a larger area of implant-bone contact.
**GENERAL CONSIDERATIONS**

With Type 3A defects, there is greater proximal bone loss than in Type 2 defects. The bone loss extends distally at or below the lesser trochanteric region, and the metaphyseal anterolateral support is markedly reduced. Therefore, with less overall proximal or subtrochanteric bony support, more emphasis must be placed on distal fixation near the isthmus.

Because the metaphyseal portion of the femur has increased in diameter and there is greater proximal bone loss, a large 45 mm offset stature component will most often be used. An 8-in. straight or bowed stem or a 8-in. calcar stem is suggested for this type of defect. As in the Type 2 defect, postreduction stability must be achieved. One method is to utilize a broach with a head/neck segment for trial reduction. Alternatively, dynamic reduction can be determined by inserting the trial component (Figure 9). The trial is 1.5 mm less in diameter than the corresponding porous-coated implant which improves ease of insertion and extraction of the trial component. It also allows the surgeon to become familiar with the femur by inserting and reinserting the trial component. As the component is rotated and advanced distally to match the femoral curve, note the amount of initial anteversion and the distance of distal advancement necessary before the bowed component is rotated (Figure 10). This provides a “feel” for the intramedullary canal.

Optimally, postreduction stability should be achieved with trials secured against axial and torsional forces.

**REAMING**

To determine if the straight 8-in. stem can be safely advanced distally to maximally fill the canal, ream and X-ray the canal using the techniques described earlier in the Type 2 defect. On some occasions, the small stature stem may also be used to accomplish further distal advancement. Again, the reaming and intraoperative X-ray techniques described earlier may be helpful.
**BROACHING**

Due to the significant bone loss that accompanies Type 3A defects, broaching is not performed in most cases.

**TRIALING/IMPLANTATION**

If the lateral X-ray of the femur shows no curve, then a straight stem must be used. If the femur is excessively curved, then an osteotomy must be performed and a straight femoral component is recommended. The bowed stem will most often be used in the Type 3A and 3B defects. If the 8-in. straight stem cannot be advanced distally, then select an 8-in. bowed stem (*Figure 11*). If substantial calcar is missing, an 8-in. straight calcar or a 9-in. bowed calcar stem may be utilized. The proper calcar stem is determined by inserting the appropriate calcar trial into the endosteum.

If structural bone graft is required, insert it over the defect that has been packed with particulate graft. As the prosthesis advances, secure the graft with Control cable or wire. By applying fixation to the graft at the same time, the prosthesis becomes more fixed proximally and ensures more rigid proximal fixation. Bone grafting should be undertaken at the discretion of the surgeon.
GENERAL CONSIDERATIONS

With a Type 3B femoral defect, there is no support from the metaphysis as the lesser trochanter and medial metaphysis are absent. Fixation will come almost exclusively from the intact isthmus. In addition to the 8-in. bowed and 9-in. bowed calcar stems, use of a 10-in. bowed stem may also be indicated. A trial reduction can be performed using the appropriate monolithic stem trial.

When the medial bone loss does not progress far distally into the diaphysis, use either an 8-in. straight or bowed stem. Again, the reaming technique and intraoperative X-ray techniques described in the Type 2 defect section will help determine which of these two stems to use to maximally fill the canal. If the medial metaphyseal defect extends further distally toward the proximal portion of the diaphysis, or if distal rotational control is not adequate with either the 8-in. bowed or straight stem, the use of a 10-in. bowed stem is suggested.

During revision surgery of the femur, either a straight or bowed extensively coated femoral component can be employed depending on anatomy and explanation technique. The indication for using a straight femoral component, either the 6-in. AML or 8-in., is in Type 1, Type 2 and some Type 3A femoral defects. However, when there is little or no support against rotation, such as in the Type 3B femoral defect, then more distal fixation is necessary and may require a bowed stem to avoid perforation or fracture.

When a straight stem of the appropriate diameter is used in a Type 3B, it may contact the anterior femoral cortex before adequate distal advancement is achieved. This necessitates the use of a bowed, extensively coated femoral component. In the Type 3B femoral defect where the metaphysis and isthmus offer little or no control against rotation, further distal advancement of the femoral component is recommended. When accurate preoperative templating is carried out and the curve of the femur is similar to that of the bowed femoral component, the implant can be safely advanced distally, resulting in excellent control against rotation.

FEMORAL CONDITION

- The metaphysis is nonsupportive.
- The diaphysis is not intact due to severe bone loss.
- Distal fixation over 4 cm can be achieved at the isthmus.
Insertion of the bowed stem, especially one with 15-degree anteversion, requires a different surgical technique than that of a conventional straight stem (Figure 12). Accurate preoperative templating is mandatory. A/P and Lowenstein lateral X-rays of the entire femur are necessary. The lateral X-ray must adhere to strict conditions so that the curve of the femoral component can be matched as accurately as possible to the anterior bow of the femur in the preoperative stage.

If the anterior bow of the femur does not correspond to the curve of the prosthesis, then the bowed prosthesis cannot be used. For example, if the lateral X-ray of the femur shows no curve, then a straight stem must be used. If the femur is excessively curved, then an osteotomy must be performed and a straight femoral component is recommended. The bowed stem will most often be used in the Type 3A and 3B defects.
REAMING/CANAL PREPARATION
Remove all cement and membranous tissue, then begin intramedullary reaming using the thin-shaft reamers. Since the femoral component will be advanced far distally in the intramedullary canal, the reamers must be able to follow the curve of the femur. Using thin-shaft reamers allows the reamer to be positioned appropriately so that the proximal aspect of the femur does not control and direct it anteriorly.

Take care to direct the thin-shaft reamer in the center of the intramedullary canal (Figure 13).

Compromising proximal anterior bone stock is avoided when thin-shaft reamers are used. A conventional reamer can be directed only so far posteriorly since the thickened posterior cortical ridge in the mid-portion of the intramedullary canal will offer resistance. As this bone is reamed, resistance from it and the proximal anterior bone will continue to direct the conventional reamer anteriorly. Thus impingement of the conventional reamer and potential perforation of the anterior cortex in the bow of the femur will occur before maximum canal fill is achieved (Figure 14).
Begin reaming with the small diameter thin-shaft reamer and progress to the larger diameters until encountering resistance. Note that these reamers are somewhat aggressive and should not be forced. Avoid any abnormal binding of the reamer.

Take care when reaming near bony defects or severely compromised cortical bone, since perforation could occur. To avoid this potential, expose the femur by elevating the vastus lateralis so the path of the reamer may be directly observed.

With visualization of the canal achieved and proper reamer orientation confirmed, the surgeon can be confident that any resistance encountered is from the entire circumference of the femur, rather than from the anterior cortex. The diameter at which resistance is encountered with the reamer should come close to the diameter for the bowed stem overlay that was used with the lateral X-ray as part of the preoperative templating. If significant resistance is encountered, obtain an intraoperative X-ray.

Do not under-ream when using the extensively coated bowed stem. Be sure to over-ream by .5 mm when using thin-shaft reamers, as this will ease insertion of the bowed stem during final implantation. Before implantation, corresponding rigid reamers may be employed to establish optimal lateralization of the femoral endosteum. When the appropriate diameter has been determined and confirmed to be satisfactory, insert a smooth, tapered tip trial.

**BROACHING**

Due to the significant bone loss that accompanies Type 3B defects, broaching is not performed in most cases.

**TRIALING/IMPLANTATION**

Initially insert the trial component in approximately 40 – 70 degrees of anteversion. Advance it distally by hand, grasping the proximal aspect of the component until some resistance is met distally (Figure 15). At this time, rotate the trial toward less anteversion, enabling the distal aspect of the trial component to conform to the anterior curve of the femur. Perform this maneuver a number of times until you can determine the amount of initial proximal anteversion as well as the point at which the component must be rotated as it advances distally.
Perform a trial reduction to assess postreduction stability, to determine whether significant proximal advancement of the implant is necessary and to achieve optimal head/neck length for appropriate leg length and lateral offset (Figure 16). The Solution System hip’s parallel-sided design provides further options for biomechanical adjustments. Its distal fixation provides the option of raising or lowering the implant for leg length adjustments. The parallel-sided proximal body allows for rotational adjustments to re-establish proper anteversion. These features will enable further adjustments upon implantation to ensure proper biomechanics and postoperative stability.

Remove the trial component and insert the actual porous-coated implant that conforms to the trial (Figure 17). The implant is extensively coated distally to the level at which the tip of the implant becomes tapered. The tapered tip enables safe advancement of the implant, avoiding impingement against the anterior cortex (Figure 18).
Before final impaction of the implant, necessary bone grafting should be performed at the surgeon’s discretion. Advance the implant in the same manner as the trial. Begin inserting it with the amount of anteversion determined by the trial component. Slowly advance the implant distally by hand, maintaining the same anteversion until minimal resistance is met. Position the impactor device proximally. Use a mallet to strike the inserting device until further resistance is encountered. When the component meets initial engagement, advance the component distally by striking the impactor with a mallet. A steady, repetitive cadence is recommended for continuing component advancement. Continue this maneuver, gradually reducing the anteversion while simultaneously advancing the component distally.

If there are any concerns about the position of the implant within the intramedullary canal, extract the component in the opposite manner of insertion. An X-ray is recommended to determine component positioning or sites for anatomic impingement.

The bowed femoral component with its ability to significantly fill the femoral canal in both A/P and lateral planes (distally well beyond the curve of the femur) provides extremely good control against rotational forces. The Solution System hip’s extensive porous coating also affords resistance to rotation as well as axial migration. Take an X-ray intraoperatively when the prosthesis has been fully impacted to assess implant position and canal fill (Figure 19).
Due to massive, extensive meta-diaphyseal damage and erosion of the cortical isthmus, alternative methods must be considered such as proximal massive femoral allografting or impaction bone grafting.

Impaction bone grafting (IBG) using DePuy’s triple taper C-Stem™ hip offers one option for handling a Type 4 femoral defect (Figure 20). Please refer to the IBG C-Stem surgical technique (Cat. No. 0611-53-050).
REFERENCES


IMPORTANT
This Essential Product Information summary does not include all of the information necessary for selection and use of a device. Please see full labeling for all necessary information.

INDICATIONS
Total Hip Arthroplasty (THA) is indicated for: a severely painful and/or disabled joint from osteoarthritis, traumatic arthritis, rheumatoid arthritis or congenital hip dysplasia; avascular necrosis of the femoral head; acute traumatic fracture of the femoral head or neck; failed previous hip surgery; and certain cases of ankylosis.

CONTRAINDICATIONS
THA is contraindicated in cases of: active local or systemic infection; loss of musculature, neuromuscular compromise or vascular deficiency in the affected limb, rendering the procedure unjustifiable; poor bone quality; Charcot’s or Paget’s disease.

WARNINGS AND PRECAUTIONS
Components labeled for “Cemented Use Only” are to be implanted only with bone cement. The following conditions tend to adversely affect hip replacement implants: excessive patient weight, high levels of patient activity, likelihood of falls, poor bone stock, metabolic disorders, disabilities of other joints. The following are the most frequent adverse events after THA: change in position, loosening or fracture of components, dislocation, infection, tissue reaction.

For more information about the Solution System hip, visit our web site at www.jnjgateway.com/revisionhip.

SOLUTION SYSTEM ORDERING INFORMATION

8-in. Straight, Small Stature, 12/14 Taper

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8-in. Straight, Large Stature, 12/14 Taper

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<tr>
<td>1572-08-225</td>
<td>22.5 mm, Right</td>
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</tbody>
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9-in. Bowed Calcar, Large Stature, 2.25 cm Platform, 12/14 Taper

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Size, Orientation</th>
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<tbody>
<tr>
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<td>13.5 mm, Left</td>
</tr>
<tr>
<td>1572-25-150</td>
<td>15.0 mm, Left</td>
</tr>
<tr>
<td>1572-25-165</td>
<td>16.5 mm, Left</td>
</tr>
<tr>
<td>1572-25-180</td>
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</tr>
<tr>
<td>1572-25-195</td>
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</tr>
<tr>
<td>1572-25-210</td>
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</tr>
<tr>
<td>1572-25-225</td>
<td>22.5 mm, Left</td>
</tr>
<tr>
<td>1572-26-135</td>
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</tr>
<tr>
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<tr>
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<tr>
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</tr>
<tr>
<td>1572-26-195</td>
<td>19.5 mm, Right</td>
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<td>21.0 mm, Right</td>
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<tr>
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10-in. Bowed, Large Stature, 12/14 Taper

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<tr>
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<tr>
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</tbody>
</table>