Patient Guide
DePuy Ceramax®
Ceramic Total Hip System

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Glossary of Terms

Acetabulum: Hip socket.

Adverse: Harmful or unfavorable.

Anesthetic: Drug used to eliminate the feeling of pain.

Anesthesiologist: A physician who is specialized in the practice of anesthesiology, the branch of medicine involving the use of drugs or other agents that cause the feeling of pain to be blocked.

Artificial joint: Artificial parts used for replacing a hip joint.

Avascular Necrosis: A condition that results in death of the bone due to loss of blood supply. When this condition happens in the hip, it often results in a decay of the bone in the femoral head (the top part of the thighbone) because of too little or no blood flowing to it.

Bearing: The bearing is the area of interaction between the moving parts of the joint replacement implant. For a hip joint replacement implant it's where the ball and the liner meet. Bearing materials can be made out of metal, ceramic or plastic.

BIOLOX® *delta*: A zirconia-alumina, ceramic composite matrix engineered to resist cracks and fractures.

Bone cement: A mixture formed by the chemical reaction of two chemical agents (a monomer and a polymer) that produces a grout-like material that is used for some joint replacement surgeries for attaching the joint replacement prosthesis to the surrounding bones. In some artificial hip joint replacement surgeries it can be used in the thigh bone (femur) and/or the socket bones (acetabulum).

Calcification: Hardening of the tissue.

Cemented use: An implant that is used with bone cement. **(**See **Bone cement** definition)

Composite diagnosis: Term used when combining two or more similar diagnoses or conditions into one diagnosis or condition.

Degenerative joint disease: A condition that causes the loss of cartilage and bone in a joint that eventually leads to increased joint pain and reduced joint function.

Dislocation: When the moving parts of the joint slip out of position. This term applies to both the patient's own joint, as well as artificial joint. **(**See **Hip Dislocation** definition)
Femoral: Related to the thighbone (femur).

Femur: Thighbone.

Fixation: The stabilization (connection) of an implant to surrounding bone or cement.

Hematoma: A localized swelling filled with blood.

Hip dislocation: When the head of the femur (thighbone) slips out of the socket bones (pelvis) of the hip joint. This problem that can also occur with an artificial hip joint replacement device whereby the ball head of the device separates from the socket of the device.

Hip joint: A ball and socket joint consisting of a rounded femoral head or "ball" that fits into a cup or "socket" to allow movement between the thigh bone and the hip bone (pelvis).

Hip replacement: When an artificial or man-made ball and socket device replaces the patient's own hip joint.

Hip revision: Replacement of an artificial hip device with a new artificial hip device (this may be required for a broken or failed device or an infection).

Immunosuppressed: A condition where the patient's immune system is not as effective as normal.

Impingement: Excessive pressure is placed on the tissue around the hip device.

Intraoperative: During the time of the surgery.

Metal ions: Metal atoms with a positive or negative charge. .

Migration: A complication resulting from a movement of the artificial joint replacement device from its original position. When the femoral device and/or the acetabular device changes position within the surrounding bones following hip joint replacement surgery.

Myocardial Infarction: A heart attack.

Noncemented use: An implant that is used without bone cement. **(**See **Bone cement** definition)

Noninflammatory degenerative joint disease (NIDJD): A general term used to describe a damaged hip joint from osteoarthritis, avascular necrosis and/or post-traumatic arthritis.

Operative site: The part of the body being operated on.

Osteoarthritis: A loss of bone and cartilage that may lead to joint pain and stiffness.

Osteolysis: The loss of calcium in the bone.

Osteomyelitis: Inflammation of the bone due to infection; can be a complication of surgery or injury, although infection can also reach bone tissue through the bloodstream. Both the bone and the bone marrow may be infected.

Osteonecrosis: A loss of blood supply to the bones characterized by changed shape and increased thickness of the bone, a flattening of the joint surface (See also **Avascular Necrosis** definition**).**

Osteoporosis: A loss or weakening of bone.

Physiotherapy: Therapy that uses physical agents such as exercise, massage.

Postoperative: The period following surgery.

Post-traumatic arthritis: Arthritis caused by a serious injury to the joint.

Precaution: Less severe than warnings and inform about a non-life threatening hazard that is associated with a device. (See **Warning** definition.)

Primary joint replacement: Replacement of the natural joint with an artificial joint.

Pyogenic: Producing pus (commonly a site of infection or foreign material in the body**).**

Pulmonary Embolism: Blood clot in the lung.

Rehabilitation: Exercise that is prescribed by a doctor following joint replacement surgery to help improve the healing process and overall function of the joint that was replaced with an artificial joint.

Revision: Replacement of a failed device with a new device.

Rheumatoid arthritis: A condition in which the body's immune system begins to attack the tissue surrounding the joint leading to joint pain, stiffness and inflammation.

Skeletally immature: The bones of the skeleton are still growing.

Slackness: Not tight, taught, firm or tense; looseness or laxity. The affected joint feels unsteady and "catches" or "slips" as it moves.

Systemic: Pertaining to the whole body

Traumatic arthritis: A condition that results in loss of bone and cartilage in the joint after a physical injury.

Trochanteric bursitis: Swelling of the large sacs that separate the hip bones from the muscles and tendons of the thighs and buttocks. This results in tenderness on the upper, outside portion of the thigh bone.

U.S. Food and Drug Administration (U.S. FDA): The government agency that regulates medical devices in the United States.

Venous Thrombosis: Blood clot in the veins.

Warning: Serious and life threatening circumstances that are associated with a device.

Wear resistance: Ability to withstand or resist wearing out of parts of the joint that are in contact with each other as they move. This term applies to both the patient's own joint and to an artificial joint.

Important Note: This brochure should be read in its entirety BEFORE the patient has his or her surgery.

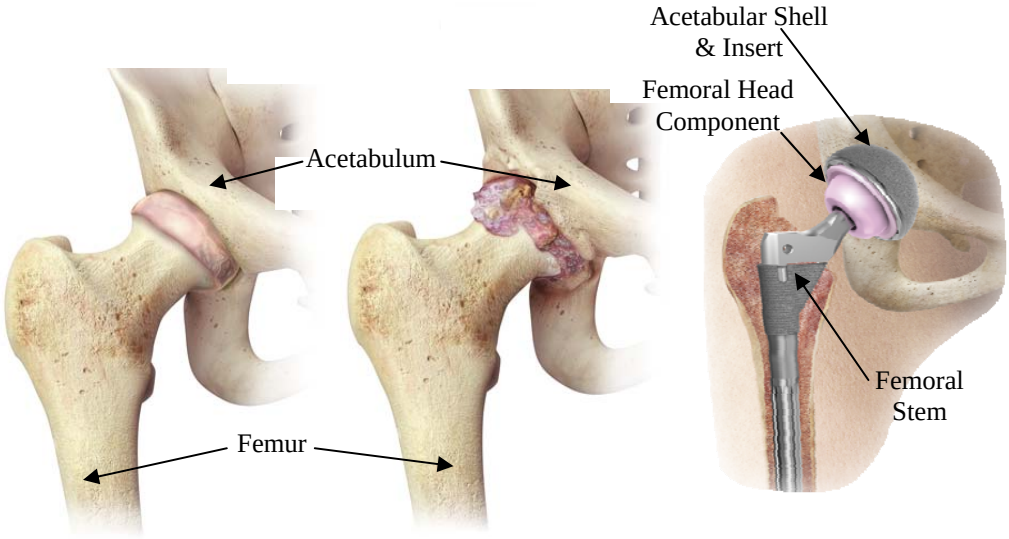
Background information

The hip joint allows movement to occur between the thighbone (femur) and the hip bone (pelvis). The pelvis contains a "socket", which is called the acetabulum. The ball-shaped head of the femur fits into the acetabulum, forming a "ball and socket joint" that allows the leg to have a wide range of movements such as walking and squatting.

There are many conditions that can develop in the hip joint that may make it necessary to have a hip replacement. Some of the more common conditions include:

- Osteoarthritis: A slow loss of bone and cartilage in the hip joint that may include the abnormal formation of bone and cartilage around the joint, leading to pain and stiffness.
- Avascular Necrosis: A condition that results in death of the bone in the femoral head (the ball part of the thighbone) due to loss of blood supply. A decay of the bone in the femoral head (the bone below the hip ball) because of too little or no blood flowing to it .
- Post-Traumatic Arthritis: A condition that results in loss of bone and cartilage in the hip joint after a physical injury.

Due to the similarities between these conditions patients can expect the same outcome regardless of which one of these diagnoses they have, so they are normally grouped into a single category termed, " noninflammatory degenerative joint disease", or NIDJD. There are several treatment alternatives available for NIDJD. Your doctor has discussed these with you and has advised that you consider replacement of your hip joint with an artificial hip joint device, also known as a total hip replacement prosthesis.



Healthy Hip | Arthritic Hip | Hip Replacement Components

What is the DePuy Ceramax® Ceramic Total Hip System?

There are many artificial hip joint devices available in the United States. The following is a description of one kind of artificial hip called the DePuy Ceramax® Ceramic Total Hip System. The DePuy Ceramax® Ceramic Total Hip System is intended for treatment of the noninflammatory degenerative joint disease (NIDJD) condition just described.

The DePuy Ceramax® Ceramic Total Hip System is a ceramic-on-ceramic bearing total hip replacement prosthesis system. The system consists of five parts:

- **Femoral Head**
  The femoral head is made from an alumina composite matrix ceramic material called BIOLOX® *delta.*
- **Ceramic Insert**
  The ceramic insert is named Ceramax® and is made from the same BIOLOX® *delta* alumina composite ceramic matrix material as the femoral head.
- **Acetabular Shell**
  A metal cup made from titanium alloy. Some acetabular shells are designed to allow for bone screws and some are not.
- **Bone Screws**
  The metal screws are made from titanium alloy.
- **Femoral Stem**
  The metal femoral stem is made from titanium alloy.

The BIOLOX® *delta* femoral head component replaces the top of your thighbone and is attached to the metal stem component. The metal stem fits into your thigh bone without the use of bone cement (non-cemented fixation). The Ceramax® insert is assembled to the metal acetabular shell which is secured to your hip socket without the use of bone cement (non-cemented fixation). Depending on which acetabular shell your surgeon chooses for you, bone screws may or may not be used to anchor the shell in place (adjunctive fixation). The BIOLOX® *delta* femoral head attached to the top of the metal stem in your thigh bone moves against the Ceramax® insert within the acetabular shell in your hip socket to allow for movement of your hip.

The DePuy Ceramax® Ceramic Total Hip System is the only hip system currently approved by the U.S. Food and Drug Administration and available in the U.S that utilizes BIOLOX® *delta* for the ceramic femoral heads and the acetabular liners.

What type of patient is right for the DePuy Ceramax® Ceramic Total Hip System?

(Indications for Use)

The DePuy Ceramax® Ceramic Total Hip System can be used in patients that are:

- Skeletally mature
- Diagnosed as having noninflammatory degenerative joint disease (NIDJD) which is a general term used to describe a damaged hip joint from osteoarthritis, avascular necrosis and/or post-traumatic arthritis,
- Their own hip joint (primary hip replacement surgery)
- The condition of their hip bones allows for the metal parts of the artificial hip implant to be inserted without bone cement (noncemented fixation)

What type of patient is not indicated for the DePuy Ceramax® Ceramic Total Hip System?

(Contraindications)

You should **NOT** receive a DePuy Ceramax® Ceramic Total Hip System if you have any of the following conditions:

- Skeletally immature, since the leg bones of their skeletons are still growing and presence of the artificial joint could cause shortening of the leg ;

- Evidence of active infections that may spread to other areas of the body (e.g., osteomyelitis, pyogenic infection of the hip joint, overt infection, urinary tract infection, etc.) which could lead to infection within the hip that has the artificial joint, thereby requiring that it be removed ;

- The presence of any known neoplastic (tumor-causing) or metastatic (spread of cancerous cells) disease which could negatively affect the outcome, especially if chemotherapy, radiation or other treatments are required for treating these conditions ;

- Significant neurologic or musculoskeletal disorders or diseases that may adversely affect gait, weight bearing or postoperative recovery (e.g., muscular dystrophy, multiple sclerosis) which may compromise the patients' rehabilitation therapy following their joint replacement surgery;

- Presence of highly communicable disease(s) that may limit follow-up (e.g., immuno-compromised conditions, hepatitis, active tuberculosis, etc.) and could increase in duration and/or severity after the surgery;

- Any condition that may interfere with postoperative recovery e.g., Paget's disease (a bone disorder), Charcot's disease (a neurologic disorder) and could significantly compromise patient rehabilitation resulting in an unsatisfactory or poor functional outcome;

- Inadequate bone stock to support the device (e.g., severe osteopenia or osteoporosis) which could lead to movement (migration) or loosening of the hip joint device components within the surrounding bone(s) or result in a fracture of the bone(s) and/or the implant;

- Poor skin coverage around the hip joint which could lead to an infection of the surgical wound;

- Known allergies to the artificial hip implant materials which could lead to an allergic reaction by the tissues surrounding the hip joint and/or allergic reactions in other areas away from the hip;

- Marked atrophy (muscle and/or tissue loss) or deformity in the upper femur such as a birth defect affecting the leg bones which could significantly compromise patient rehabilitation following the surgery and/or result in an unsatisfactory or poor functional outcome.

- Inflammatory degenerative joint disease (such as rheumatoid arthritis) which was not approved by the Food and Drug Administration for treatment with this device.

- Joint instability that cannot be corrected and could result in a dislocation of the artificial joint or reduced or complete loss of patient mobility.

Your doctor will need to review your overall health to determine whether the DePuy Ceramax® Ceramic Total Hip System is appropriate. You should inform your doctor about any health problems you have, even if it is **NOT** related to your hip because some medicines as well as diseases (such as diabetes) can affect bone strength in the future.

What are the warnings and precautions for the DePuy Ceramax® Ceramic Total Hip System?

Warnings

Be aware that the artificial hip joint can fail (does not function as it was designed to do) if there are extreme stresses placed on it. Failures may be from the type of work performed, such as heavy labor. Failure may also occur if you are considered extremely overweight or suffer from a physical or a mental condition that causes you to fall.

If the artificial joint fails, you will need to have a second operation to have it removed from their hip.

Precautions

There are limitations with any artificial hip joint and it is important for you to listen and follow your surgeon's recommendations. Some precautions include:

- **DO NOT** put excessive weight on the hip joints immediately after surgery.
- **DO NOT** attempt to move the hip joint more than what was told by the surgeon.
- **DO** follow the instructions given about exercising the hip joints prior to and after surgery.
- **DO** tell the surgeon if there are changes in overall health after surgery, such as running a temperature, drainage or an odor coming from the surgical wound or an increase in the amount of pain experienced at the hip.

Failure to take the appropriate precautions **COULD** increase the length of time it takes for your recovery and **COULD** result in being dissatisfied with the outcome of your hip replacement surgery.

What are risks with the DePuy Ceramax® Ceramic Total Hip System?

Most of the risks associated with hip replacement with the DePuy Ceramax® Ceramic Total Hip System are expected to be similar to those of other artificial hip replacements; however, there are some risks that are only with the DePuy Ceramax® Ceramic Total Hip System. Each of these reactions or complications with the DePuy Ceramax® Ceramic Total Hip System or with other hip replacements can occur during and after surgery and may require medical intervention (such as more surgery) and removal of the artificial hip implant. Once implanted, the functional life of any hip replacement system cannot be predicted. To reduce the risk for failure (the artificial hip does not function as it was designed to do), patients should discuss with their doctors what they should do prior to surgery and carefully follow any instructions given. The risks and complications **only** with the DePuy Ceramax® Ceramic Total Hip System include:

- Chipping or cracking of the ceramic femoral head and/or ceramic insert components
- Wear of the ceramic acetabular components has been reported following total hip replacement. Wear may be from particles of metal, or other debris that can cause scratching of the surfaces of the parts that move against each other (bearing surfaces). Higher rates of wear may shorten the useful life of the artificial hip, and could lead to another surgery to replace the worn prosthetic components (revision surgery).
- Squeaking or other noises of the hip joint during activities such as walking. The significance of this occurrence is unknown.

The risks and complications with the DePuy Ceramax® Ceramic Total Hip System **and** with other artificial hip replacements include:

- Femoral (thighbone) or hip bone (socket) fracture may occur while implanting the hip replacement device
- Particles of the hip replacement parts and bone may be generated by contact between the hip implant and bone. These particles may cause local responses such as bone breakdown, or they may move to other parts of the joint and cause painful tissue irritation. Particles in between the hip implant parts or between the hip implant and bone may cause more particles to form at an increasing rate and cause more breakdown of bone. Breakdown of bone can lead to having to remove or replace the hip implant parts.
- Rarely, an artificial hip component can break as a result of improper assembly, trauma, strenuous activity, the component is in the wrong position, or it has gone past the functional life.
- One or more of the components can come apart. (Component dissociation.)
- Chronic inflammatory response due to metal sensitivity
- Potential for post-operative and continued joint pain
- Reduced function at the hip
- Damage to blood vessels resulting in hematoma (a localized swelling filled with blood)
- Temporary or permanent nerve damage resulting in pain or numbness of the affected limb
- Undesirable shortening or lengthening of the leg treated with the artificial hip implant (leg length inequality)
- Cardiovascular disorders including venous thrombosis (blood clot in the veins), pulmonary embolism (blood clot in the lung), or myocardial infarction (heart attack)
- Temporary or permanent nerve damage
- Delayed wound healing
- Infection
- Migration (movement) or loosening of the hip implant, or partial or complete dislocation of the hip implant can result from improper positioning of the components or trauma (accidents).
- Undesirable bone formation or changes (ossification or calcification), with or without affecting joint mobility

- Inadequate range of motion due to improper selection or positioning of hip implants
- Death

Many of these risks and others can cause the artificial hip implant to fail (does not function as it was designed to do), and it is not possible to identify each and every cause for failure. The most common reasons cited for failure of the artificial hip replacement surgery are:

- An infection that develops within the hip joint necessitating removal of the hip joint prosthesis
- The hip joint becomes loose from the bone caused by a fall
- An adverse bone reaction caused by particles coming from the implant
- A complete or a partial dislocation of the ball head and socket components causing the implant to be unstable
- Severe pain where the cause may or may not be known
- The tissues around the implant react adversely to particles coming from the implant
- The position of the hip prosthesis changes
- One or more of the device components breaks or the device comes apart (disassociates).

What adverse events have been reported?

There were two investigational studies of the DePuy Ceramax® Ceramic Total Hip System conducted in the U.S. The data and other information from those studies formed the basis for the approval by the U.S. Food and Drug Administration of the DePuy Ceramax® Ceramic Total Hip System.

The first study investigated the DePuy Ceramax® Ceramic Total Hip System with 28 millimeter BIOLOX® *delta* femoral head components and 28 millimeter Ceramax® ceramic acetabular insert components and is called the 28mm COC (ceramic-on-ceramic) study.

The second study investigated the 36 millimeter the DePuy Ceramax® Ceramic Total Hip System with 36 millimeter BIOLOX® *delta* femoral head components and 36 millimeter Ceramax® ceramic acetabular insert components and is called the 36mm COC (ceramic-on-ceramic) study.

Adverse events occurring in patients receiving the DePuy Ceramax® Ceramic Total Hip System were compared to adverse events occurring in patients receiving a commercially available artificial hip joint having 28 millimeter sizes of femoral head and acetabular insert sizes as part of the study. More information about these two studies can be found in the ***"What do the clinical studies show?"*** section of this Patient Guide brochure.

The following tables summarize the adverse events reported from each (28mm COC and 36mm COC) study that happened during and following the surgery for the DePuy Ceramax® Ceramic Total Hip System.

The number of adverse events to patients that happened following the hip replacement surgery for the 28mm COC (Ceramic-on-Ceramic) investigational study.

Descriptions of the Adverse Events During The Surgery	28mm COC Number of Patients	28mmmm COC Percentage of Patients
Ceramic Liner Broke	2 out of 178	1.1%
Damage To A Nerve	1 out of 177	0.6%
Difficult To Get The Ceramic Liner To Fit In Place	4 out of 178	2.3%
Difficult To Get The Femur Part Of The Artificial Hip To Fit Into The Thighbone	2 out of 177	1.1%
Fracture Of The Thighbone	5 out of 177	2.8%
Genitourinary (Related To Reproductive Or Urinary Organs)	1 out of 177	0.6%
Hematologic (Related To Blood)	1 out of 177	0.6%

The number of adverse events to patients that happened during the hip replacement surgery for the 36mm COC (Ceramic-on-Ceramic) investigational study.

Descriptions of the Adverse Events During The Surgery	36mm COC Number of Patients	36mm COC Percentage of Patients
Ceramic Liner Broke	1 out of 169	0.6%
Cardiovascular	2 out of 168	1.2%
Fracture Of The Thighbone	1 out of 168	0.6%
Hematologic (Related To Blood)	1 out of 168	0.6%
An Instrument Broke During The Surgery	1 out of 168	0.6%

The number of adverse events to patients that happened following the hip replacement surgery for the 28mm COC (Ceramic-on-Ceramic) investigational study.

Descriptions of the Adverse Events After The Surgery	28mm COC Number of Patients	28mm COC Percentage of Patients
Ceramic Liner Failed	1 out of 177	0.6%
Ceramic Liner Broke	1 out of 177	0.6%
Artificial Hip Dislocated	5 out of 177	1.2%
Inflammation Of The Tissues Covering The Upper Thighbone (Bursitis)	6 out of 177	3.4%
Breakdown Of The Bone (Lysis)	1 out of 177	0.6%
Excessive Bone Formation Around The Artificial Hip (Heterotopic Bone)	1 out of 177	0.6%
Femur Part Of	3 out of 177	1.7%

Artificial Hip Components Became Loose		
Fracture Of Upper Thighbone (Trochanter)	2 out of 177	1.1%
Hip Or Thigh Pain	4 out of 177	2.3%
Infection At Or Near The Artificial Joint	2 out of 177	1.1%
†Other Adverse Events	18 out of 177	10.2%
Surgical Wound Became Infected	9 out of 177	5.1%
Weakness Of Hip Muscles	5 out of 177	2.8%

†There were 18 other adverse events reported following the surgery for the 28mm COC study. In the 28mm COC study these 18 events were: Blister (1); Damaged Nerve (1);Hip and/or thigh pain (2); Muscle Pain (2); Pain in the groin area (1); Pain after a fall (2); Pain in the thigh, buttock and calf (1); Patient Fell (1); Patient suffered physical injury (Trauma) (1); Patient's surgical wound felt warm (1);Swelling caused by blood (Hematoma) (1); Swelling in the leg (1);Tendons in the hip and/or the leg that became inflamed (3).

The number of adverse events to patients that happened following the hip replacement surgery for the 36mm COC (Ceramic-on-Ceramic) investigational study.

Descriptions of the Adverse Events Following The Surgery	36mm COC Number of Patients	36mm COC Percentage of Patients
Ceramic Liner Failed	1 of 168	0.6%
Ceramic Liner Broke	1 of 168	0.6%
Artificial Hip Dislocated	2 of 168	1.2%
Artificial Hip Partially Dislocated (Subluxation)	1 of 168	0.6%
Inflammation Of The Tissues Covering The Upper Thighbone (Bursitis)	17 of 168	10.1%
Excessive Bone Formation Around The Artificial Hip (Heterotopic Bone)	3 of 168	1.8%
Femur Part Of Artificial Hip Components Became Loose	1 of 168	0.6%
Fracture Of Upper Thighbone (Trochanter)	1 of 168	0.6%
Hip Or Thigh Pain	6 of 168	3.6%
Infection At Or Near The Artificial Joint	2 of 168	1.2%
Muscle And/Or Bone Problems	16 of 168	9.5%
*Other Adverse Events	14 of 168	8.3%
Pain (Not Specified)	8 of 168	4.8%
Skin Condition	3 of 168	1.8%
**Squeaking Or Other Noises Coming From The Hip	15 of 168	8.9%
Stiffness Of The Hip	1 of 168	0.6%
Surgical Wound Became Infected	6 of 168	3.6%
Weakness Of Hip Muscles	4 of 168	2.4%

*There were 14 other adverse events reported following the surgery for the 36mm COC study. In the 36mm COC study these 14 events were: Bruise (1); General Hip Pain (2); Patient Falls (3); Stiffness (1); Swelling

caused by blood (Hematoma) (1); Tendons in the hip that became inflamed (6).

[**]15 patients with a 36mm COC device reported 17 noise related adverse events: squeaking (8); clicking (7); snapping (1); vibration (1).

How can ceramic artificial hip joints fail?

Artificial hip joints can and do fail (does not function as it was designed to do), and there are many causes for these failures to happen. Depending on the how and when the failure happened, also called the failure mode, the effects on the patient (and caregivers) may vary. When designing the DePuy Ceramax® Ceramic Total Hip System, the potential modes of failure were considered. While the risk for failure is considered to be low, and the probable benefit to patients outweighs the risk, a description of the failure, the cause for the failure and effects from the failure are summarized in the following table.

Description Of The Failure	Probable Cause For The Failure	Probable Effect Of The Failure
Ceramic component breaks during the surgery	Wrong ceramic component or component not correctly assembled with the metal shell	Ceramic and metal components are replaced with new components and the surgery takes significantly longer
Ceramic component breaks after the surgery	Wrong ceramic component or component not correctly assembled with metal shell; trauma to hip such as a fall.	Hip joint pain and/or adverse tissue reaction surrounding the hip joint; another surgery needed to replace some or all of the artificial hip components.
Ceramic component does not fit into the metal shell during surgery	Wrong ceramic component or component not correctly assembled to the metal shell	Either the metal shell, ceramic component or both are replaced and the surgery takes significantly longer.
Ceramic component does not fit into the metal shell after the surgery		Another surgery needed to replace some or all of the artificial hip components.
Femoral ball head comes out of the socket during surgery	Wrong ball head or ceramic liner component or the components were not correctly aligned.	Some or all of the artificial hip joint components are replaced and the surgery takes significantly longer
Femoral ball head comes out of the socket after surgery	Wrong ball head or ceramic liner component or the components were not correctly aligned; trauma to hip such as a fall.	Hip joint functions poorly; another surgery needed to replace some or all of the artificial hip components.
Ceramic and/or metal particles in the hip joint after surgery	Wrong ball head or ceramic liner component, components were not correctly aligned or	Hip joint pain and/or adverse reaction of the tissues surrounding the hip joint;

	ceramic components chipped or scratched.	another surgery needed to replace some or all of the artificial hip components.

What are potential benefits of the DePuy Ceramax® Ceramic Total Hip System?

Hip replacement can help people resume routine movements of everyday life, like climbing stairs, tying shoes and getting up from a chair. **While there is no guarantee of success**, benefits of hip replacement may include pain reduction and regaining motion.

Your surgeon has decided that you will benefit from hip replacement surgery. The three most common materials used in artificial hip replacement devices are Ceramic-on-Ceramic (ceramic ball with a ceramic liner), Metal-on-Plastic (metal ball with a plastic liner) and Metal-on-Metal (metal ball with a metal liner). Each device type may decrease hip pain and improve function.

The DePuy Ceramax® Ceramic Total Hip System is an option for patients that may allow for their return to activities in their everyday lives. It has been engineered with materials to optimize strength and durability and has been extensively tested in the lab and in clinical trials (studies done on humans).

While there is no conclusive evidence that supports the benefits to patients of the DePuy Ceramax® Ceramic Total Hip System over other artificial hips, the clinical and laboratory testing have shown the DePuy Ceramax® Ceramic Total Hip System to have less wearing of the components when compared to Metal-on-Plastic artificial hip components. Patients may benefit from the DePuy Ceramax® Ceramic Total Hip System by having a more durable artificial hip that won't wear out as quickly as a Metal-on-Plastic artificial hip. There are concerns with reports of serious adverse reactions in patients having Metal-on-Metal artificial hips. These adverse reactions are believed to be caused by the metal particles and/or metal ions coming from the metal bearing components. Patients may benefit from the DePuy Ceramax® Ceramic Total Hip System compared to a Metal-on-Metal artificial hip replacement device because the DePuy Ceramax® Ceramic Total Hip System uses ceramic bearing components instead of metal bearings.

You should discuss with your surgeon the possible risks and benefits of the DePuy

Ceramax® Ceramic Total Hip System compared to the risks and benefits of other types of artificial hip replacement devices.

What can you do to prepare yourself for surgery?

As with all surgery, there are a number of things which the doctor and hospital staff will ask you to do to help the operation be successful. If you have any questions or concerns, ask your doctor or hospital staff.

Your doctor may want you to meet the Physical Therapist (PT) before surgery. The PT may give you some tips on preparing your house for rehabilitation and how you should sleep, get out of bed, sit, stand, and walk following surgery. In addition, before you go to the hospital, there are several things you can do before surgery to help make your recovery easier.

- **Commit to the success of your surgery**
  Working as a team, you, your physician, physiotherapist and your family (or care giver) must adopt a positive attitude toward the success of your surgery. Together, you will gain a clear understanding of the common goals and expectations of the procedure.

- **Remain as active as possible**
  Remaining active while waiting for your surgery is an important key to the success of your surgery. Studies have shown that the stronger and more flexible you are before your operation, the quicker you will recover and more flexible you will be after the operation. Gentle exercise such as walking, range of motion exercises and swimming can help you to stay strong and flexible. **DO** seek your doctor's advice before beginning any exercise.

- **Stop smoking**
  If you have not already done so, you should stop smoking at least four weeks before your surgery. This will help reduce the risk of complications during and after your surgery.

- **Make sure all infections are cleared up prior to the surgery**
  These include: tooth abscesses, bladder infections, infections such as leg ulcers, colds and the flu. This is because infections could spread through your body during the operation and infect your new replaced joint. **Therefore, DO tell your surgeon immediately if you suspect you have an infection, as your surgery may have to be rescheduled**.

- **Rearrange your furniture**

Rearrange your furniture to create wide traffic paths and remove obstacles. Make it as easy and safe as possible to move around your home during your recovery.

- **Life after the operation**

  You will need to have someone available to drive you home after the surgery. Additionally, for the first few weeks following your surgery, you'll need some help with typical household chores like cooking, cleaning, shopping, bathing, and doing laundry. If you don't have a spouse, relative or friend who can help you with these tasks, your healthcare team can assist you in making arrangements (in advance) for someone to help you.

How is hip replacement surgery performed?

In preparation for surgery, your anesthesiologist (the person who puts you to sleep and provides drugs or other agents to cause the feeling of pain to be blocked) will examine you. This is an opportunity for you to ask any questions before the actual surgery. On the day of your surgery, it is usual for your doctor to ask you not to drink or eat anything. The area around your hip may be shaved of any hair to reduce the risk of infection. You may also be given tablets or an injection to relax you before the operation. This is known as a "pre-med". You will then be taken into the operating room where you will be given either a general or a regional anesthetic prior to your surgery. The surgery may take between 1-2 hours to complete.

The surgical procedure for a ceramic-on-ceramic total hip replacement involves removing your diseased hip bone and replacing it with an artificial ceramic ball on a metal stem. The metal stem is inserted into your thighbone. After a special instrument shapes the hip socket, a metal shell is placed into the socket. A ceramic liner is then inserted into the shell which provides the bearing surface. Finally, a ceramic ball is placed onto the metal stem which is placed into the new socket.

There are generally 6 steps to the hip replacement surgery. These include the following:

Step 1: After making an incision, the hip joint is exposed.

Step 2: Your surgeon will remove your femoral head from your acetabulum (hip socket). This is done so the surgeon has clear access to the hip joint.

Step 3: The damaged surfaces of the femoral head and acetabulum are then removed and the underlying bone is prepared to accept the artificial hip implants.

Step 4: The new hip implant components are placed into the femur and acetabulum.

Step 5: Once all the implant components are in place, your surgeon will place the new femoral head into the acetabular component and check that the movements are full, smooth and stable.

Step 6: Finally, the surgeon will close the incision (wound), dress it, and ensure you get bedrest.

What problems may occur during your surgery?

Please refer to the section in this brochure describing *"**What are the risks with the DePuy Ceramax® Ceramic Total Hip System?"*** for a comprehensive listing of the risks for hip replacement surgery and review these with your surgeon prior to surgery.

While rare, some problems that can occur during the surgery include:

- Femoral (thighbone) or hip bone (socket) fracture may occur while implanting the hip replacement device chipping or cracking of the ceramic femoral head and/or ceramic insert components
- Damage to blood vessels resulting in hematoma (a localized swelling filled with blood)
- Temporary or permanent nerve damage resulting in pain or numbness of the affected limb Undesirable shortening or lengthening of the leg treated with the artificial hip implant (leg length inequality)
- Cardiovascular disorders including venous thrombosis (blood clot in the veins), pulmonary embolism (blood clot in the lung), or myocardial infarction (heart attack)
- Death

What can you expect after your operation?

Immediately after your surgery, you will be moved to a post-operative recovery room for close monitoring. You may have one or two intravenous drips in your arm to introduce fluids and/or medication into your body. When you wake up from surgery, your affected leg may be swollen and bruised and your muscles may be stiff and sore. You may be given pain medications to take regularly while you are recovering.

When you are fully conscious, breathing well and your blood pressure and pulse are stable after surgery, you will be taken back to your hospital room. You may not feel like eating much at first, but it is important that you drink liquids.

Recovery from any operation varies from patient to patient and post-operative rehabilitation programs vary from hospital to hospital and surgeon to surgeon. The following is a general recovery timeline after surgery:

Day 1: Move about with physiotherapy and a walking frame

Day 2/3: Move about with physiotherapy and independently with crutches

Day 3/4: Move about with physiotherapy and independently with a cane

Day 4-6: Return home

DO follow your surgeon's instructions carefully. You surgeon will give you detailed post-operative instructions before you leave the hospital. It is important to follow your surgeon's instructions so healing from surgery can occur as quickly as possible.

Ongoing Evaluation:
DO follow your doctor's schedule for examinations after surgery. Routine examinations will include regular X-ray exams to look for any problems such as hip bone or implant breakage, implant position changes, or anything abnormal. X-rays will also check the progress of bone healing around the implants. Routine examinations may also include blood work and urine analysis.

When should I call the doctor after surgery?

Infection:
Contact your doctor if you experience any of the following signs of infection:

- Drainage and/or unusual odor from the surgical incision
- Fever/temperature above 100.4° F for two consecutive days
- Redness, swelling or increased pain at or near the surgical incision

Infections can travel from other parts of your body to your new hip implants. **If you have any infection in any part of your body, DO contact your doctor immediately.**

- **Pain or Instability:**
  Some pain is normal and expected during your rehabilitation period, and the pain should slowly decrease in the six to 12 weeks following surgery. If you experience any serious, immediate, or constant hip pain, pressure, feelings of unsteadiness, or if you are suddenly unable to put weight on your hip after the surgical pain has gone away, you should contact your doctor. These signs (symptoms) may be a signal of a serious problem (such as bone breakage, dislocation, infection, device loosening, movement, or breakage).

- **Delayed wound healing**

- **Inadequate range of motion due to improper selection or positioning of hip parts**

- **Undesirable shortening or lengthening of the limb caused by improper selection of hip implant size**

- **Device-related noises, such as squeaking, clicking, popping or grinding**

- **Cardiovascular disorders, including blood clots in the veins or lungs**

What alternatives do you have?

Depending on individual circumstances, alternative procedures may include the use of other commercially available total hip replacement parts already approved or cleared by the U.S. FDA; non-surgical treatment such as reduced activity and/or pain medication; or other surgical treatments that do not involve the use of an implant such as a hip fusion. Additionally, your doctor can recommend nonsurgical therapy such as weight loss, mild exercise programs, physical therapy

What can you do to improve your recovery?

Be sure to protect the new artificial hip implants from too much stress after surgery and always follow your surgeon's advice and instructions. To do this, you should avoid high level activity such as playing basketball or doing heavy physical work. **DO NOT participate in high impact activities such as running or jumping during the first year after your surgery.** These activities can cause broken bones, loosening of implant components, or early wear of the implants.

Generally, within 6 weeks after surgery, you may return to driving and to work. You should be able to return to normal activities within a few months of the surgery, including gardening, and other low impact activities.

Please read and comply with the follow-up care and treatment instructions given by the physician and always follow your surgeon’s advice on hip precautions. Following your surgeon’s instructions and advice will improve the chances for a successful outcome of your artificial hip replacement surgery and your satisfaction with the results.

What do the clinical studies show?

Two clinical studies were performed to evaluate the safety and effectiveness of the DePuy Ceramax® Ceramic Total Hip System. The first study collected data on 177 patients with the 28 millimeter size of DePuy Ceramax® Ceramic Total Hip System and the second study collected data on 168 patients with the 36 millimeter size DePuy Ceramax® Ceramic Total Hip System. The results from both of these patient groups were compared to those from a group of patients receiving a standard total hip device, that is, a control device, having a ceramic-on-polyethylene (plastic) ball and socket articulation. This ceramic-on-polyethylene control group consisted of 87 patients for the comparison with patients having a 28 millimeter DePuy Ceramax® Ceramic Total Hip System; 74 of these same ceramic-on-polyethylene patients with large components were

used for the comparison with patients having a 36 millimeter DePuy Ceramax® Ceramic Total Hip System.

28 mm DePuy Ceramax Ceramic Total Hip System Study

Safety Data
Complication (safety) information was collected from the entire group of 264 hips. (177 ceramic-on-ceramic, 87 ceramic-on-polyethylene). There were no statistically significant differences in the proportions of adverse events (postoperative systemic or operative-site, or intraoperative complications) between the DePuy Ceramax® Ceramic Total Hip System patients versus the standard ceramic-on-polyethylene total hip system patients.

In other words, the overall complication rate and types of complications for the DePuy Ceramax® Ceramic Total Hip System were similar to the types reported for the standard ceramic-on-polyethylene total hip system. The most common operative site complications were trochanteric bursitis, wound problems, dislocations and musculoskeletal adverse events.

The revision rate (the number of artificial hip implants that were either removed or replaced) between the DePuy Ceramax® Ceramic Total Hip System and the standard total ceramic-on-polyethylene hip system was also similar. Four patients out of 177 DePuy Ceramax® Ceramic Total Hip System patients required a revision of their hip replacement prosthesis system and two patients with standard total ceramic-on-polyethylene total hip prosthesis systems required revision of their ceramic-on-polyethylene total hip system. Reasons for revision in the DePuy Ceramax® Ceramic Total Hip System patients were: 1) infection 2) acetabular liner failure 3) implant loosening and 4) patient fall. The reason for revision in both of the standard ceramic-on-polyethylene total hip system patients was recurrent dislocation of the prosthesis.

There were no deaths directly related to the use of the device in the study.

Effectiveness Data
Effectiveness information was collected from the entire group of 264 hips. Harris Hip Total Scores were used to summarize clinical outcome. The Harris Hip Rating is a widely used numeric scoring system that tells doctors how well patients are functioning with their hip replacement device, including their ability to walk (with or without aid), the amount of movement in their hip (range of motion) and their level of pain. There are 100 points possible in the Harris Hip Rating system and the patient's overall result is based on their score. A Harris score from 90 to 100 is rated as **Excellent**, 80 to 89 is rated as **Good**, 70 to 79 is rated as **Fair** and below 70 points is a **Poor** result.

Preoperatively, 171 of the DePuy Ceramax®Ceramic Total Hip System patients (96.6%) had a "Poor" Harris Hip Total Score. Post-operatively, after 24 months, 145 of 164 DePuy Ceramax® Ceramic Total Hip System patients (88.4%) that reported at this time had a "Good" or "Excellent" Harris Hip Total Score.

These same data were also collected from the group of patients that received the standard

ceramic-on-polyethylene total hip system device. Preoperatively, 86 of the standard ceramic-on-polyethylene total hip system patients (98.9%) had a "Poor" Harris Hip Total Score. Post-operatively, after 24 months, 73 of 81 the standard ceramic-on-polyethylene total hip system patients (90.1%) that reported at this time had a "Good" or "Excellent" Harris Hip Total Score.

36 mm DePuy Ceramax Ceramic Total Hip System Study

Safety Data

Complication (safety) information was collected from the entire group of 242 hips. (168 ceramic-on-ceramic, 74 ceramic-on-polyethylene) With the exception of noise related adverse events, there were no statistical differences in the proportions of adverse events (postoperative systemic or operative-site, or intraoperative complications) between the DePuy Ceramax® Ceramic Total Hip System patients versus the standard ceramic-on-polyethylene total hip system patients. There were 15 DePuy Ceramax® Ceramic Total Hip System patients who were reported to have noise complications. Some of these noise related complications were deemed by the surgeon to be possibly related to the DePuy Ceramax® Ceramic Total Hip System.

The revision rate (the number of artificial hip implants that were either removed or replaced) between the DePuy Ceramax® Ceramic Total Hip System patients versus the standard ceramic-on-polyethylene total hip system patients was similar. Three patients out of 168 DePuy Ceramax® Ceramic Total Hip System patients required revision of the DePuy Ceramax® Ceramic Total Hip System and two patients required revision of the conventional total ceramic-on-polyethylene hip system. Reasons for revision in the DePuy Ceramax® Ceramic Total Hip System patients were: 1) infection 2) ceramic liner fracture and 3) implant loosening. The reason for revision in both standard ceramic-on-polyethylene total hip system patients was recurrent dislocation of the prosthesis.

There were no deaths directly related to the use of the device in the study.

Effectiveness Data

Effectiveness information was collected from the entire group of 242 hips. Harris Hip Total Scores were used to summarize clinical outcome. The Harris Hip Rating is a widely used numeric scoring system that tells doctors how well patients are functioning with their hip replacement device, including their ability to walk (with or without aid), the amount of movement in their hip (range of motion) and their level of pain. There are 100 points possible in the Harris Hip Rating system and the patient's overall result is based on their score. A Harris score from 90 to 100 is rated as **Excellent**, 80 to 89 is rated as **Good**, 70 to 79 is rated as **Fair** and below 70 points is a **Poor** result.

Preoperatively, all 168 of the DePuy Ceramax® Ceramic Total Hip System patients (100%) had a "Poor" Harris Hip Total Score. Post-operatively, after 24 months, 143 of 159 DePuy Ceramax® Ceramic Total Hip System patients (90.0%) had a "Good" or "Excellent" Harris Hip Total Score.

These same data were also collected from the group of patients who received the standard

ceramic-on-polyethylene total hip system. Preoperatively, 73 of the standard ceramic-on-polyethylene total hip system patients (98.6%) had a "Poor" Harris Hip Total Score. Post-operatively, after 24 months, 63 of 71 standard ceramic-on-polyethylene total hip system patients (88.7%) had a "Good" or "Excellent" Harris Hip Total Score.

Limitations Of The Studies
The two studies of the DePuy Ceramax® Ceramic Total Hip System were limited to patients having a specific diagnosis of noninflammatory degenerative joint disease (NIDJD) in only one hip, as well as other specific criteria including age, weight and activity levels. Use of the DePuy Ceramax® Ceramic Total Hip System was restricted to patients who came under these criteria that were defined in the study protocol. Therefore, the safety and efficacy of the DePuy Ceramax® Ceramic Total Hip System for patients with conditions other than those that were defined by the study plan has not been established.

Important safety information

Every surgery has risks and benefits. The performance of total hip replacement depends on your age, weight, activity level and other factors. There are potential risks, and recovery takes time. People with conditions limiting rehabilitation should not have hip replacement surgery. Only an orthopaedic surgeon can tell if total hip replacement is right for you.

Any time after your operation, if a physician prescribes an MRI scan for you**, DO inform your physician that the DePuy Ceramax® Ceramic Total Hip System has not been evaluated for safety and compatibility in the MR environment.**

User assistance information sources

Discuss any questions regarding your hip surgery and the DePuy Ceramax® Ceramic Total Hip System with your surgeon. For further information regarding the DePuy Ceramax® Ceramic Total Hip System, you may also contact the manufacturer:

DePuy Orthopaedics, Inc.
700 Orthopaedic Dr.
Warsaw, IN 46582
www.DePuyOrthopaedics.com
1-800-366-8143

For more information about hip replacement please visit www.hipreplacement.com

How long will my implant last?

The functional life expectancy of an artificial hip to remain attached within the hip joint, how long it will take for it to wear out and the how the tissues will react with time to any particles that are shed by the implant is not clearly known at the present time. It is a possibility that some or all of the components may need to be removed from your hip and replaced with other components at some point in the future.

Are there instructions for when you travel?

As with many other medical implants and devices, your hip replacement implant may activate metal detector alarms such as those at airport security checks. **DO tell the security attendant about your artificial hip**. Ask your surgeon to provide you with a card to present that explains that you have had a hip replacement if a security device alarm is activated.

Rev. XXX

IMPORTANT INFORMATION – Please Read Before Use

DePuy
companies of Johnson & Johnson

IFU-0902-00-824
Rev.

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DePuy Ceramax™ Ceramic Total Hip System

DePuy Orthopaedics, Inc.
700 Orthopaedic Drive
Warsaw, IN 46582
Telephone 1-800-366-8143

DePuy Ceramax™ Ceramic Total Hip System

CAUTION: FEDERAL LAW (USA) RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A PHYSICIAN

INFORMATION FOR PRESCRIBERS

How Supplied

Implant Components: Sterile
Surgical Instruments: Non-Sterile Unless Otherwise Specified (Refer To Device Package Label)

DESCRIPTION

The DePuy Ceramax™ Ceramic Total Hip System is a modular system consisting of a ceramic on ceramic acetabular bearing couple (alumina composite matrix ceramic femoral head and alumina composite ceramic matrix acetabular liner) combined with a compatible metal shell (cup) and screws and titanium alloy femoral stems identified below. Both the femoral heads and acetabular liner components are manufactured from BIOLOX *delta* alumina (Al_2O_3) matrix composite ceramic by CeramTec AG. All implantable devices are supplied sterile (see sterilization section) for single use.

Descriptions of the 28mm and 36mm sizes of Ceramax ceramic inserts and BIOLOX *delta* ceramic femoral heads and the compatible components for each system are provided below.

28 mm Ceramax System

BIOLOX® *delta* ceramic femoral heads
The alumina composite matrix ceramic heads have a 11/13 taper and are offered with an outside diameter of 28mm in three (+0 mm, +3 mm and +6 mm) neck lengths. The 28mm alumina composite matrix ceramic heads are also available with a 12/14 taper and three (+1.5 mm, +5 mm, +8.5 mm and +12mm) neck lengths. DePuy BIOLOX® *delta* ceramic femoral heads are only compatible with the DePuy femoral prostheses identified here and in **Table 1**.

Ceramax™ (BIOLOX® *delta)* ceramic liner (insert)

The alumina composite matrix ceramic acetabular liners are offered in ten sizes with internal diameters of 28mm. The 28mm internal diameters are offered in outer diameters of 48-66 mm in 2 mm increments. A taper-fit connection allows assembly into the mating metal acetabular shell components.

Pinnacle Acetabular Cups

The Pinnacle 100 replacement prostheses with a single apex hole. The metal outer acetabular shell components are manufactured from Ti-6Al-4V (ASTM F620). A porous coating of commercially pure (CP) titanium beads (ASTM F1580) covers the outer surfaces of the shells. The metal outer shells are available with 48, 50, 52, 54, 56, 58, 60, 62, 64, 66 mm outer diameters.

Bone Screws

The DePuy 6.5mm diameter cancellous bone screws are optional, and are available in titanium alloy (ASTM F136) in sizes ranging in lengths from 15-70 mm.

DePuy Femoral Stems

The DePuy Ceramax™ Ceramic Total Hip System uses the commercially available DePuy S-ROM® and Tri-Lock BPS titanium alloy (ASTM F136) femoral stem components.

The titanium alloy femoral stems, S-ROM with 11/13 trunnions and Tril-Lock BPS with 12/14 trunnions, are for cementless use. The S-ROM stems are available in standard and lateralized versions. The Tri-Lock BPS stems are available with standard and high offsets. The stems are partially coated with a commercially pure titanium porous coating.

Table 1: 28mm Ceramax System Component Compatibility

Femoral Stem	**BIOLOX delta femoral head (OD, neck lengths, internal tapers)**	**Ceramax™ ceramic acetabular insert (ID X OD)**	**Pinnacle 100 acetabular shells (OD)**	**6.5mm diameter Pinnacle Cancellous Bone Screws**
S-ROM Modular Hip	28mm +0, +3, and +6 (11/13 taper)	28 x 48, 28 x 50, 28 x 52, 28 x 54, 28 x 56, 28 x 58, 28 x 60, 28 x 62, 28 x 64, 28 x 66mm	48 – 66mm	15-70mm
Tri-Lock BPS Hip	28mm +1.5 , +5 , +8.5, (12/14 taper)	28 x 48, 28 x 50, 28 x 52, 28 x 54, 28 x 56, 28 x 58, 28 x 60, 28 x 62, 28 x 64, 28 x 66mm	48 – 66mm	15-70mm

36 mm Ceramax System

BIOLOX® *delta* ceramic femoral heads

The alumina composite matrix ceramic heads have a 11/13 taper and are offered in outside diameter of in three (+0 mm, +3 mm and +6 mm) neck lengths. The 36mm alumina composite matrix ceramic heads are also available with a 12/14 taper and three (+1.5 mm, +5 mm, and +8.5 mm,) neck lengths. DePuy BIOLOX® *delta* ceramic femoral heads are only compatible with the DePuy femoral prostheses identified here and in **Table 2**.

Ceramax™ (BIOLOX® *delta)* ceramic liner (insert)

The alumina composite matrix ceramic acetabular liners are offered in eight sizes with an internal diameter of 36mm. The eight sizes of 36mm internal diameters are offered in outer diameters of 52-66 mm in 2 mm increments. A taper-fit connection allows assembly into the mating metal acetabular shell components.

Pinnacle acetabular cups

The Pinnacle 100 and Pinnacle Sector II acetabular cups are hemispherical type replacement prostheses with a single apex hole. The Sector II has three screw holes that allow for adjunctive fixation with 6.5mm diameter bone screws. The metal outer acetabular shell components are manufactured from Ti-6Al-4V (ASTM F620). A porous coating of commercially pure (CP) titanium beads (ASTM F1580) covers the outer surfaces of the shells. The metal outer shells are available with 52, 54, 56, 58, 60, 62, 64, 66 mm outer diameters.

Bone Screws

The DePuy 6.5mm diameter cancellous bone screws are optional, and are available in titanium alloy (ASTM F136) in sizes ranging in lengths from 15-70 mm.

DePuy Femoral Stems

The DePuy Ceramax™ Ceramic Total Hip System uses the commercially available DePuy S-ROM® and Porocoat Summit™ titanium alloy (ASTM F136) femoral stem components.

The titanium alloy femoral stems, S-ROM with 11/13 trunnions and Porocoat Summit with 12/14 trunnions, are for cementless use. The S-ROM stems are available in standard and lateralized versions. The Summit stems are available with standard and high offsets. The stems are partially coated with a commercially pure titanium porous coating.

Table 2: 36 mm Ceramax System Component Compatibility

Femoral Stem	**BIOLOX delta femoral head (OD, neck lengths, internal tapers)**	**Ceramax™ ceramic acetabular insert (ID X OD)**	**Pinnacle 100 and Sector II acetabular shells (OD)**	**6.5mm diameter Pinnacle Cancellous Bone Screws**
S-ROM Modular Hip	36mm +0, +3, and +6 (11/13 taper)	36 x 52, 36x 54, 36x 56, 36x 58, 36x 60, 36x 62, 36x 64, 36x 66mm	52 – 66mm	15-70mm

Summit Hip	36mm +1.5, +5, +8.5 and +12 (12/14 taper)	36 x 52, 36x 54, 36x 56, 36x 58, 36x 60, 36x 62, 36x 64, 36x 66mm	52 – 66mm	15-70mm

INDICATIONS FOR USE

The DePuy Ceramax™ Ceramic Total Hip System is indicated for noncemented use in skeletally mature individuals undergoing primary total hip replacement surgery for rehabilitation of hips damaged as a result of noninflammatory degenerative joint disease (NIDJD) or any of its composite diagnoses of osteoarthritis, avascular necrosis, and post-traumatic arthritis.

Note: DePuy Ceramax Ceramic Total Hip System inserts are only intended for use with DePuy femoral and acetabular components having matching outer and inner diameters.

CONTRAINDICATIONS

Use of the DePuy Ceramax™ Ceramic Total Hip System is contraindicated in the following situations:

- Skeletally immature patients (tibial and femoral epiphyses not closed);
- Evidence of active infections that may spread to other areas of the body (e.g., osteomyelitis, pyogenic infection of the hip joint, overt infection, urinary tract infection, etc.);
- The presence of any known neoplastic (tumor-causing) or metastatic (spread of cancerous cells) disease;
- Significant neurologic or musculoskeletal disorders or diseases that may adversely affect gait, weight bearing or postoperative recovery (e.g., muscular dystrophy, multiple sclerosis);
- Presence of highly communicable disease(s) that may limit follow-up (e.g., immuno-compromised conditions, hepatitis, active tuberculosis, etc.);
- Any condition that may interfere with postoperative recovery (e.g., Paget's disease, Charcot's disease);
- Inadequate bone stock to support the device (e.g., severe osteopenia or osteoporosis)

- Poor skin coverage around the hip joint;
- Use in patients with known allergies to the implant materials;
- Marked atrophy (muscle and/or tissue loss) or deformity in the upper femur such as a birth defect affecting the leg bones.
- Inflammatory degenerative joint disease (like rheumatoid arthritis)
- Joint instability

INFORMATION FOR USE

The DePuy instrumentation system, as well as DePuy's system of trial components, must be used to assure proper fit and alignment of the prosthesis. Correct fit and alignment will reduce stresses at interface surfaces to enhance implant fixation. The surgeon should refer to the appropriate surgical technique manual on use of the instrument system and implantation of the prosthesis. A special instrument is provided to enable the surgeon to remove the insert once it has been fitted in place.

WARNINGS AND PRECAUTIONS

Warnings:

WARNING
If postoperative chipping or breakage of one or both of the ceramic device components is confirmed, surgery for their removal must be performed as soon as reasonably possible.

Only physicians who are familiar with the implant components, instruments, procedure, clinical applications, adverse events, and risks associated with the DePuy Ceramax™ Ceramic Total Hip System should use this device.

Improper prosthesis selection or alignment, inadequate fixation, use where contraindicated or in patients whose medical, physical, mental or occupational conditions will likely result in extreme stresses to the implant may result in premature failure due to loosening, fracture or wear. Postoperative care is extremely important. The patient should be instructed on the limitations of the device and should be cautioned regarding load bearing, ranges of motion and activity levels permissible. Early motion and load bearing should be carefully monitored.

The Ceramax ceramic inserts are intended for use only with BIOLOX *delta* ceramic femoral heads in corresponding diameter sizes. The inner diameter of the ceramic insert must correspond to the hip head size. Use of a ceramic insert with a non-matching hip head size will result in higher stresses, accelerated wear and early failure.

This implant should not be used with other manufacturers' components or instruments. Use of components or instruments other than those recommended could lead to loosening, wear, fracture and premature failure.

- Do not mix inserts and shells from different systems. Ceramax ceramic inserts can be used only with Pinnacle acetabular shells.
- Implants are for single use only. Do not reuse an implant in order to ensure there has been no damage to the implants.
- Do not allow damage to the polished bearing surfaces or taper locking surfaces. Any alteration, damage, contour or bend to these surfaces will reduce the fatigue strength of the prostheses and may result in failure under load. Any prostheses so damaged must not be used.
- Replace both the ceramic liner and the metal acetabular shell if the ceramic liner is chipped, cracked, or otherwise damaged during shell/liner assembly. Once the acetabular shell taper has been assembled to a ceramic liner, it should not be reassembled to another ceramic liner. A deformed metal taper could significantly affect the locking mechanism between the new liner and shell and increase the risk of ceramic liner fracture.
- Do not scratch or dent the rim or internal taper of the acetabular shells. If the rim or taper joint is damaged during implantation, the acetabular shell should be replaced, as the deformation of the shell taper may affect the locking mechanism between the liner and shell and increase the risk of ceramic liner fracture.
- Do not implant in pregnant patients as the extra weight and exposure to radiation may be harmful to the implant and fetus.
- Do not implant in obese patients because overloading the component may lead to fracture or loss of fixation.

DePuy's Single Use devices have not been designed to undergo or withstand any form of alteration, such as disassembly, cleaning or re-sterilization, after a single patient use. Reuse can potentially compromise device performance and patient safety.

When used with multiple components of a total replacement system, the MR compatibility and safety of the entire system of implants has not been evaluated and the entire system of implants has not been tested together for heating or migration in the MR environment.

Precautions:

<u>Pre-operative</u>

- The patient should be informed of all potential risks and adverse effects contained in this package insert. The patient should be warned that the implants can break or become damaged as a result of strenuous activity or trauma.

- Preoperative planning provides essential information regarding the appropriate prosthesis and likely combinations of components. If, during preoperative planning, an appropriately sized component is not available, the procedure should

not take place. An appropriate range of implant sizes should be available prior to performing the surgical procedure.

- To prevent contamination of this prosthesis, keep free of lint and powders. Do not open the package until surgery.
- Diabetes, at present, has not been established as a contraindication. However, because of increased risk for complications such as infection, slow healing, slow wound healing, etc., the physician should fully consider the advisability of hip arthroplasty in the severely diabetic patient.

- When assembling the acetabular components, first place the ceramic liner into the metal shell by hand. Prior to impacting, confirm that proper seating of the ceramic liner has occurred by palpating the shell/liner assembly. It is critical that the ceramic liner is stable within the shell prior to impacting with the ceramic liner driver instrument. Impaction should not occur and the ceramic liner should be removed if it becomes mal-aligned within the shell. Repeated impaction of the liner in the shell when the initial attempt at seating the liner is unsuccessful is not recommended and may lead to early failure. If the ceramic liner and shell are not fully seated or are aligned incorrectly after final impaction, it will be necessary to revise the shell and liner with new components.

- After the liner has been inserted, the liner should be examined in-situ for evidence of chipping (visible evidence of ceramic fracture). If chipped, scratched, or otherwise damaged during the implant procedure, replace both the ceramic liner and the acetabular shell.

- Once the femoral stem taper has been assembled to a ceramic head, it should not be reassembled to another ceramic head. If the ceramic head is chipped, cracked, or otherwise damaged during head /stem assembly, replace both the ceramic head and the femoral stem.

Intra-operative

- Use the recommended trial components for size determination, trial reduction and range of motion evaluation. To prevent contamination of this prosthesis, keep free of lint and powders. Do not place the implant in contact with prepared bone surface before the final decision to implant has been made; thus preserving the integrity of the actual implants and their sterile packaging.

- The trial prostheses should not be implanted.

- Examine instruments for wear or damage before use. Instruments that have experienced excessive use or force may be susceptible to breakage.

- Carefully examine each component and its packaging for any signs of damage that may have occurred during shipping or handling. Do not implant components if the packaging is damaged or if the implant shows signs of damage. Due to the brittle nature of the material, ceramic components are particularly susceptible to premature failure when scratched, cracked or otherwise damaged. Likewise, a new implant should be handled carefully to avoid damage that could compromise the mechanical integrity of the device and cause early failure or loosening.

- Implants should be accepted by the hospital or surgeon only if received with the factory packaging and labeling intact. If the sterile barrier has been broken, return the component to DePuy Orthopaedics, Inc.

- An implant should never be re-used. Any implant, once used, should be discarded. Even though it appears undamaged, it may have small defects and internal stress patterns that may lead to failure. DePuy's Single Use devices have not been designed to undergo or withstand any form of alteration, such as disassembly, cleaning or re-sterilization, after a single patient use. Reuse can potentially compromise device performance and patient safety.
- The bore of the ceramic insert should not come into contact with abrasive surfaces, as this may damage the bore and affect performance. In addition, all mating surfaces should be clean before assembly to ensure proper seating. Incorrect seating and/or alignment may result in suboptimal contact between the femoral head and insert resulting in the potential for increased wear, chipping or damage.
- Do not scratch acetabular shells and femoral components to prevent damage to the articulation surfaces. Replace any component that has been scratched or otherwise damaged during the implant procedure.

- Ensure that the inner diameter of the acetabular shell/cup matches the outer diameter of the ceramic insert. Ensure that the outer diameter of the femoral head matches the inner diameter of the insert.

- Always ensure proper alignment and seating of the acetabular and femoral components. Malalignment of the components and/or soft tissue imbalance may cause excessive wear and early implant failure.

- Avoid impacting the taper region and the insert face to adjust the insert position. As with any ceramic insert, damage to the taper or the adjacent insert face may increase the risk for fracture and/or chipping of the insert upon its engagement with the acetabular shell.

- Care should be taken to remove bone chips and metallic debris from the implant site to reduce the risk of debris induced accelerated wear of the articular surfaces of the implant.

- Care should be taken to avoid damage to the soft tissue and blood supply during dissection of the capsular tissue.

In order to prevent sepsis, the physician is advised to follow the following recommendations:

- Consistent use of prophylactic antibiotics.
- Utilizing a laminar flow clean air system.
- Having all operating room personnel, including observers, properly attired.
- Protecting instruments from airborne contamination.
- Impermeable draping.

Post-operative

- Excessive physical activity levels and trauma to the joint replacement may cause early failure of the implant
- Loosening of the components may increase production of wear particles and accelerate damage to the bone
- Periodic, long-term follow-up is recommended to monitor the position and state of the prosthetic components, as well as the condition of the adjoining bone.
- All patients should be instructed on the limitations of the prosthesis and the possibility of subsequent surgery. The patient should be cautioned to monitor activities and protect the replaced joint from unreasonable stresses, and follow the written instructions of the physician with respect to follow-up care and treatment. The patient should be warned against unassisted activity, particularly use of toilet facilities and other activities requiring excessive motion of the hip. Patients should be informed that their weight and activity level may affect the longevity of the implant. Patients should be advised to report any pain, decrease in range of motion, swelling, fever, or unusual sounds (e.g., clicking or squeaking) as this may indicate positional changes in the implant that could lead to premature failure.

Patient Education

- Warn the patient of the surgical risks, possible adverse effects, and possible operative complications that may occur with joint arthroplasty.
- Warn the patient of the limitations of artificial joint replacement devices.
- Caution the patient to protect the joint replacement from unreasonable stresses and to follow the treating physician's instructions. In particular, warn the patient

to strictly avoid high impact activities, such as running and jumping, during the first post-operative year while the bone is healing.

- Warn the patient that artificial joint replacement devices can wear out over time and may require replacement.

- All patients should be instructed on the limitation of the prosthesis and the possibility of subsequent surgery. The patient should be cautioned to monitor activities and protect the replaced joint from unreasonable stresses and follow the written instructions of the physician with respect to follow-up care and treatment. Patients should be informed that their weight and activity level may affect the longevity of the implant. Patients should be advised to report any pain, decrease in range of motion, swelling, fever, etc. as this may indicate positional changes in the implant that could lead to premature failure.

Potential adverse Effects of the Device on Health

The following adverse effects may occur with any hip replacement surgery, including the DePuy Ceramax Ceramic Total Hip System:

Complications Associated with the DePuy Ceramax™ Ceramic Total Hip System

The most commonly reported adverse events related to the DePuy Ceramax Ceramic Total Hip System are:

1. Wear of the ceramic acetabular components has been reported following total hip replacement. Higher rates of wear may be initiated by particles of cement, metal, or other debris that can cause abrasion of the articulating surfaces. Higher rates of wear may shorten the useful life of the prosthesis, and lead to early revision surgery to replace the worn prosthetic components.
2. While rare, fatigue fracture of the prosthetic component can occur as a result of improper assembly, trauma, strenuous activity, improper alignment, or duration of service.
3. Component dissociation.
4. Breakage or chipping of the ceramic femoral head and/or ceramic acetabular insert.

Complications Generally Associated with Total Hip Arthroplasty

5. Excessive wear of the ceramic components secondary to damage of mating wear surfaces or debris particles;
6. Metal sensitivity reactions;
7. Possible detachment of the coating(s) on the femoral stem or acetabular shell components, potentially leading to increased debris particles;
8. Device related noise such as, clicking, popping, squeaking or grinding;

9. Pain;
10. Femoral or acetabular perforation, or bone fracture while seating the device;
11. Damage to blood vessels resulting in hematoma;
12. Temporary or permanent nerve damage resulting in pain or numbness of the affected limb;
13. Undesirable shortening or lengthening of the limb;
14. Traumatic arthrosis of the hip from intraoperative positioning of the extremity;
15. Cardiovascular disorders including venous thrombosis, pulmonary embolism, or myocardial infarction;
16. Temporary or permanent neuropathies;
17. Delayed wound healing;
18. Infection;
19. Osteolysis;
20. Fracture, migration, loosening, subluxation, or dislocation of the prosthesis or any of its components, any of which may require a second surgical intervention or revision;
21. Periarticular calcification or ossification, with or without impediment to joint mobility;
22. Inadequate range of motion due to improper selection or positioning of components, by femoral impingement, and periarticular calcification; and
23. Death.

Any of these adverse effects may necessitate surgical intervention. The potential long-term biological effects of metal wear debris and metal ion production are not known.

SUMMARY OF CLINICAL INVESTIGATIONS

The clinical investigation of the 28mm DePuy Ceramax™ Ceramic Total Hip System (28mm COC Study) was conducted under an approved IDE (G030075). This was a two-arm, prospective, multi-center, randomized (2 to 1), single-blind, controlled clinical investigation comparing the 28mm ceramic-on-ceramic hip system (COC28) to a conventional 28mm ceramic-on-polyethylene articulation hip system (COP28) in 264 cases (177 COC28 cases and 87 COP28 control cases). The clinical investigation of the 36mm DePuy Ceramax™ Ceramic Total Hip System (36mm COC Study) was conducted under an approved IDE supplement (G030075/S23). This was a prospective, multi-center, nonrandomized, prospectively controlled clinical investigation comparing the 36mm ceramic-on-ceramic hip system (COC36) in 168 cases to 74 COP28 control cases from the 28mm COC Study who had received an acetabular shell which was large enough to have accommodated a COC36 device.

The 28mm COC Study enrollment period was October 2003 to December 2005. The first surgery occurred on October 28, 2003 and the last surgery on December 28, 2005. There were eight investigational sites and 13 surgeons.

The 36mm COC Study enrollment period was April 2006 to August 2007. The first surgery occurred on April 12, 2006 and the last surgery on August 29, 2007. There were 5 investigational sites and 11 surgeons.

Clinical Inclusion and Exclusion Criteria (both 28mm and 36mm COC Studies)

Enrollment in the DePuy Ceramax™ Ceramic Total Hip System investigational study was limited to patients who met the following inclusion criteria:

- Cementless total hip replacement in skeletally mature (tibial and femoral epiphyses are closed) individuals 20 to 75 years of age at the time of surgery undergoing primary hip surgery for noninflammatory degenerative joint disease (NIDJD)
- Composite diagnoses of NIDJD include osteoarthritis, avascular necrosis, posttraumatic arthritis, slipped capital femoral epiphysis (SCFE), fracture of the pelvis, and developmental dysplasia
- Patients with a previous total hip replacement of the contralateral leg that has a pain rating of none or slight and who are at least one year post arthroplasty are eligible for participation in the study
- Preoperative Harris Hip Total score of less than or equal to 70
- Preoperative Harris Hip Total Pain score at least Moderate
- Radiographic evaluation confirms the presence of NIDJD
- Radiographic evaluation confirms that there is sufficient femoral and acetabular bone stock, regarding strength and shape, and is suitable to receive the implants

Patients were not permitted to enroll in the DePuy Ceramax™ Ceramic Total Hip System investigational study if they met any of the following exclusion criteria:

- Presence of a previous prosthetic hip replacement device (any type, including surface replacement arthroplasty, endoprosthesis, etc.) in the hip joint to be operated
- Previous Girdlestone procedure (resection arthroplasty) or surgical fusion of the hip to be operated
- Acute femoral neck fracture
- Above knee amputation of the contralateral and/or ipsilateral leg
- Patients with bilateral degenerative joint disease requiring staged or simultaneous hip replacements
- Patients with an existing total hip arthroplasty in the contralateral hip with a Harris Hip pain rating of mild, moderate marked or totally disabled
- Patients who have undergone total hip arthroplasties in their contralateral hips within the past 12 months
- Patients with a known allergy to metal (e.g., jewelry)
- Skeletally immature patients (tibial and femoral epiphyses are not closed)

- Evidence of active infections that may spread to other areas of the body (e.g., osteomyelitis, pyogenic infection of the hip joint, overt infection, urinary tract infection, etc.)
- The presence of highly communicable disease or diseases that may limit followup (e.g., immuno-compromised conditions, hepatitis, active tuberculosis, etc.)
- Presence of known metastatic or neoplastic disease
- Significant neurologic or musculoskeletal disorders or disease that may adversely affect gait or weight bearing, (e.g., muscular dystrophy, multiple sclerosis)
- Conditions that may interfere with the total hip arthroplasty's survival or outcome, (e.g., Paget's disease, Charcot's disease)
- Any patient believed to be unwilling or unable to comply with a rehabilitation program for a cementless total hip replacement or who indicates difficulty or inability to return for follow-up visits prescribed by the study protocol
- Patient is known to be pregnant, a prisoner, mentally incompetent, and/or alcohol or drug abuser
- Any systemic steroid therapy, excluding inhalers, within three months prior to surgery
- Patients carrying the diagnosis of inflammatory degenerative arthritis (IDJD) to include the following composite diagnoses: rheumatoid arthritis, systemic lupus erythematosus, pigmented villonodular synovitis, juvenile rheumatoid arthritis and other arthritic processes of inflammatory or autoimmune etiology
- Patients requiring structural bone grafts in order to support the prosthetic component(s) or to shape the bone to receive the implant(s)
- Patients who refuse to provide consent to participate in the clinical investigation
- Surgical replacement requires the use of an acetabular liner and femoral head greater or smaller than a 36mm diameter. (COC36 study arm only.)

Follow-up Schedule (both 28mm and 36mm COC Studies)

All patients were scheduled to return for follow up examination at 6-weeks, 6-months, 12-months, 24-months and then annually following their surgeries. (Table 1) In addition, beginning at 12-months postoperatively patient reported satisfaction outcomes were collected.

Table 1: Protocol Interval Windows (both 28mm and 36mm COC Studies)

Interval	Days
6 weeks = 6 weeks ± 2 weeks	28 – 60
6 months = 6 months ± 4 weeks	150 – 210
12 months = 12 months ± 8 weeks	300 – 420
2 years = 24 months ± 12 weeks	630 –810
3 years* = 36 months ± 16 weeks	960 –1200
4 years* = 48 months ± 20 weeks	1290 - 1590
5 years* = 60 months ± 25 weeks	1620 - 1980
6 years* = 72 months ± 25 weeks	2010 - 2340
7 years* = 84 months ± 25 weeks	2370 – 2700

** After 2-year follow-up, patients continued to be evaluated clinically and radiographically on an annual basis until all available study subjects have achieved a minimum 2-year follow-up.*

An Interim Visit Evaluation was completed any time a patient was seen outside of the defined evaluations.

Preoperatively, all patients were clinically evaluated by the following: medical history and physical examination, Harris Hip Score, and VAS pain scale.

Postoperatively, all patients were clinically evaluated at each interval by objective parameters to measure the clinical effectiveness of the device. Clinical effectiveness of this device was measured by Harris Hip Score, VAS pain scale, subjective self-report questionnaire, and radiographs. Adverse events and complications were recorded at all visits (see Table 2).

Table 2: Study Evaluation Tools (both 28mm and 36mm COC Studies)

Evaluation Tool	**Details**	**Interval**					
		Preop	Oper-ative	6 W	6M	12M	24M
Medical History	Collected patient contact information, demographics, preoperative medical history including concomitant medical conditions, medications, and allergies. This information provided baseline data.	X					
Harris Hip Score	Hips were evaluated using the modified Harris Hip Score to allow an assessment of pain, function, activities, deformity and range of motion. Range of motion was measured with a goniometer. Range of motion was not collected at the 6-week interval to protect against dislocation in the immediate postoperative period.	X		X	X	X	X
VAS Pain Scale	Patients self-reported their pain at each interval using a 100mm visual analog scale (VAS) in which 0 indicated "No Pain" and 100 indicated "Severe Pain". The subjects placed a mark on the scale to indicate their level of pain.	X		X	X	X	X
Operative Detail	Information regarding the devices used, surgical technique, intraoperative complications and hip randomization were recorded.		X				
Patient Self-Reported Data	Patients self-reported their satisfaction (on a CRF) with hip function.					X	X

Evaluation Tool	Details	Interval					
		Preop	Oper-ative	6 W	6M	12M	24M
Radio-graphic Data	No radiographic data were collected preoperatively. Two radiographic views (anteroposterior pelvis, and lateral femur) were collected postoperatively. An independent radiographic reviewer reviewed the images to assess radiographic outcomes. The independent radiographic reviewer reviewed the acetabular component position, cup migration, polyethylene liner wear, and bone-implant interface at all intervals.			X	X	X	X
Adverse Events	Postoperatively, all adverse events, device-related or not, were collected.			X	X	X	X
Interim Visits	Interim Visits were documented and included the reason for the visit. These visits included the spectrum from routine postoperative visits to visits where a subject was evaluated and/or treated for adverse events.			X	X	X	X

The key timepoints are shown above in Tables 1 and 2 summarizing safety and effectiveness.

Clinical Endpoints (both 28mm and 36mm COC Studies)

ClinicalEndpoints

The primary endpoint in this study was the Harris Hip Score at 24 months or more (24+ Month). The primary analysis for demonstrating device efficacy was a non-inferiority test of investigational vs. control Harris Hip score means under a non-inferiority margin of five (5) points.

A patient was considered to be a composite success at 24 months or more if:

- the most recent 24+ Month Harris Hip Score was greater than or equal to 80;
- the patient was a radiographic success:
  - no radiolucencies greater than 2 mm in any zone;
  - no acetabular cup migration greater than 4 mm;
  - no change in inclination greater than 4 degrees;
  - no osteolysis;
- no revision or removal occurred.

In addition to the primary analysis non-inferiority test for demonstrating device efficacy, study success for determining device safety and efficacy was based upon demonstrating:

- no differences across treatment groups with respect to complication or adverse event rates;
- no difference in the percentage of patients who were composite successes at 24+ Months.

Secondary efficacy analyses included comparisons of Harris Hip subscores, a Harris Hip longitudinal analysis, and comparison of pain visual analog scale (VAS, 100mm scale). A Kaplan-Meier survivorship analysis was carried out to compare revision rates across treatment groups.

Results for the 28mm COC Study

COC28 and COP28 data collected from October 2003 to February 2008 were used for the approval of the 28mm DePuy Ceramax™ Ceramic Total Hip System.

Subset Cohort of S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups:
Marketing approval was obtained for the S-ROM and Tri-Lock BPS femoral stems and Pinnacle 100 acetabular cup as components for the DePuy Ceramax™ Ceramic Total Hip System.

Among the 264 patients enrolled in the 28mm COC IDE study, 69 received an S-ROM/Pinnacle 100 combination. Various analyses were carried out on this Subset Cohort in addition to analyses on all enrolled subjects.

A. Accountability of 28mm COC Study Cohort

At the time of database lock for this 28mm COC PMA study, 85% (148/174) of the investigational patients and 86% (71/83) of the control patients had radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF at the completion of the study, the 24-month postoperative visit for the evaluation of the safety and effectiveness of this device. This is summarized in **Table 3** below.

Table 3: Patient Accounting for the All Enrolled Cohort, 28mm COC Study

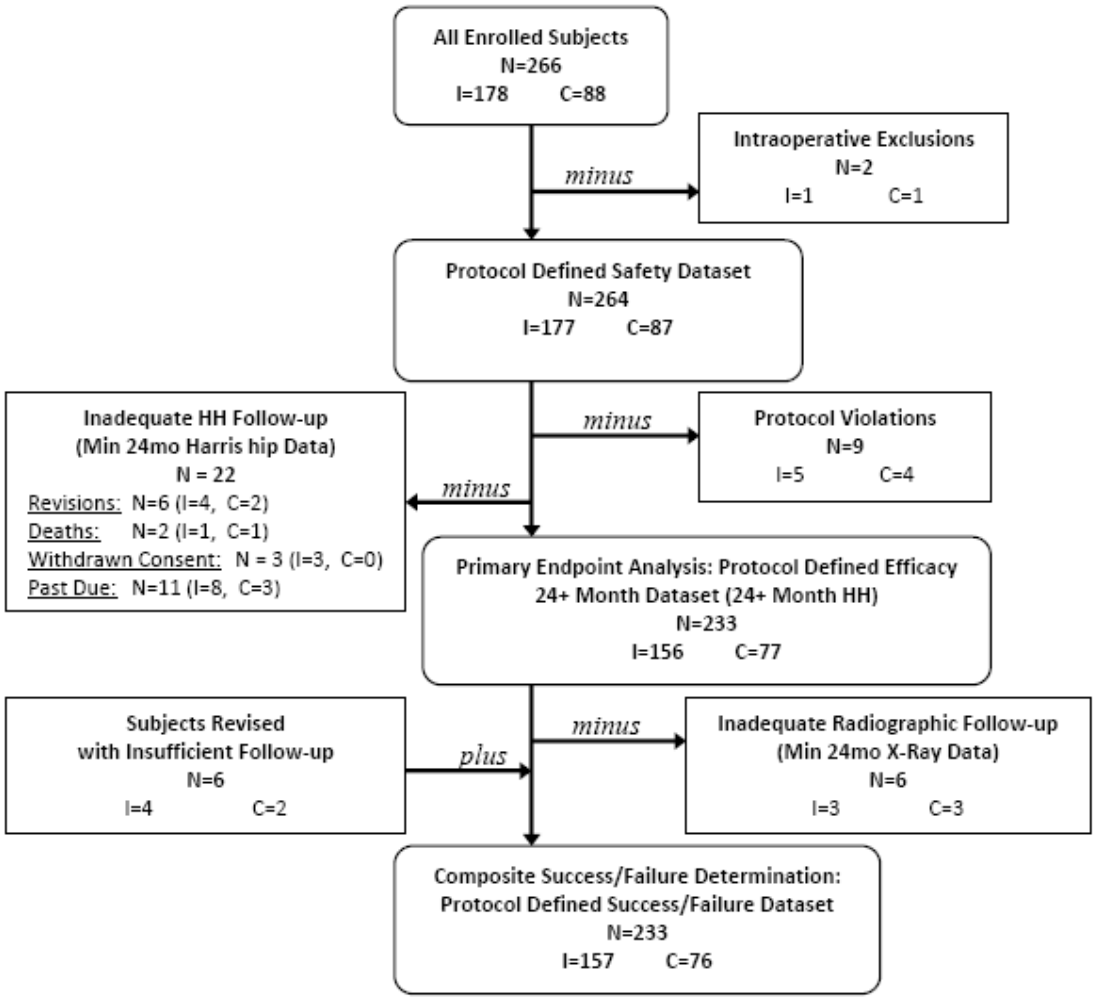
IDE Study Cohort	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	I	C	I	C	I	C	I	C	I	C	I	C
Theoretical Due	177	87	177	87	177	87	177	87	177	87	177	87
Expected Due	177	87	177	86	177	85	176	85	174	83	174	83
Withdrawn: Deaths (Cumulative)	0	0	0	0	0	1	0	1	1	2	1	2
Withdrawn: Components Removed/Revised (Cumulative)	0	0	0	1	0	1	1	1	2	2	2	2
Withdrawn: Consent (Cumulative)	0	0	0	0	1	0	1	0	2	0	3	0
Actual	173	87	156	82	154	78	162	79	148	71	158*	76
%Follow-up = Actual / Expected Due	98%	100%	88%	95%	87%	92%	92%	93%	85%	86%	91%	92%

Theoretical Due: **The number of implants that have entered the beginning of each interval window at the time of database lock.**
Expected Due: **Theoretical due patients with complete follow-up minus study withdrawals for death or revision.**
% Follow-up: **% of hips with radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF.**

Withdrawn: Consent (Cumulative)**: does not include patients who withdrew consent after complete 24 Month+ data had been obtained.**
***2 patients were revised prior to 24 months, but continued for follow-up.**

Figure 1 below is a dataset flowchart which shows all 264 patients in the 28mm COC Study, Safety Dataset, and the order in which they were excluded, from top to bottom, in order to obtain the Efficacy 24+ Month and the 24 + Month Success/Failure datasets; revisions were retained for composite success analysis regardless of exclusion criteria. The primary endpoint non-inferiority test of 24+ Month HH mean scores was carried out on the Efficacy 24+ Month Dataset.

Figure 1: Patient Accounting Dataset Flowchart: 28mm COC Study, All Enrolled Cohort



Subset Cohort of 28mm COC Study Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

The primary analysis was based on five femoral stem types and three acetabular cup types. Marketing approval was obtained for the S-ROM femoral stems and Pinnacle 100 acetabular cups as components for the DePuy Ceramax™ Ceramic Total Hip System. At the time of database lock, 40 investigational and 21 control subjects had radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF at the 24-month or later postoperative visit. This is summarized in **Table 4** below.

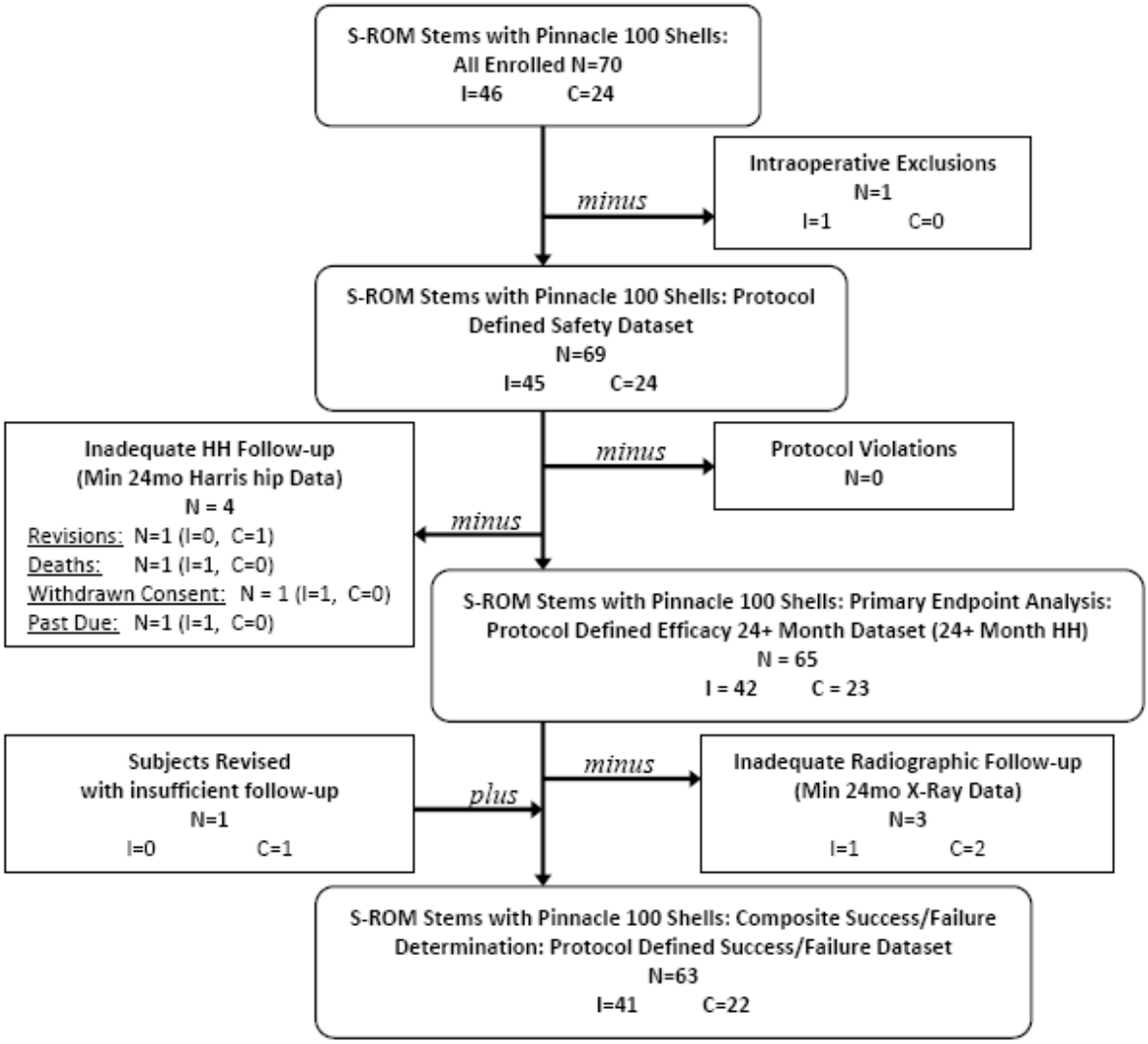
Table 4: Patient Accounting for the 28mm COC Study, Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

Subset Cohort	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	I	C	I	C	I	C	I	C	I	C	I	C
Theoretical Due	45	24	45	24	45	24	45	24	45	24	45	24
Expected Due	45	24	45	23	45	23	45	23	44	23	43	23
Withdrawn: Deaths (Cumulative)	0	0	0	0	0	0	0	0	1	0	1	0
Withdrawn: Components Removed/Revised (Cumulative)	0	0	0	1	0	1	0	1	0	1	0	1
Withdrawn: Consent (Cumulative)	0	0	0	0	0	0	0	0	0	0	1	0
Actual	45	24	40	22	35	21	41	22	34	18	40	21
%Follow-up = Actual / Expected Due	100%	100%	89%	96%	78%	91%	91%	96%	77%	78%	91%	91%

Theoretical Due: **The number of implants that have entered the beginning of each interval window at the time of database lock.**
Expected Due: **Theoretical due patients with complete follow-up minus study withdrawals for death or revision.**
% Follow-up: **% of hips with radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF.**
Withdrawn: Consent (Cumulative)**: does not include patients who withdrew consent after complete 24 Month+ data had been obtained.**

Figure 2 below is a dataset flowchart which shows all 69 28mm COC Study subjects with S-ROM stems and Pinnacle 100 shells in the Safety Dataset, and the order in which they were excluded, from top to bottom, in order to obtain the Subset Cohort of patients in the Efficacy Dataset and the Success/Failure Dataset; revisions were retained for composite success, regardless of exclusion criteria.

Figure 2: 28mm COC Study Patient Accounting Dataset Flowchart: Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups



B. 28mm COC Study Population Demographics and Baseline Parameters

The demographics of the 28mm COC Study population are typical for a total hip replacement study performed in the U.S. Clinical study data was collected on 264 hips implanted. There were 177 investigational hip implantations and 87 control hip implantations in the Protocol Defined Safety Dataset for the All Enrolled Cohort.

Comparisons were performed to determine whether the patient populations for the treatment groups were equivalent prior to study treatment. Comparisons were conducted using the Safety Dataset: means were compared with a t-test, and proportions were compared with Fisher's exact test. Results of these analyses are provided in **Table 5** below.

Table 5: 28mm COC Study Baseline Demographics for the All Enrolled Cohort

Demographic Element		Investigational N=177	Control N=87	Investigational vs. Control p-values
Enrollment	**Number of procedures**	**177**	**87**	**-**
	Number of patients	**177**	**87**	**-**
Age in years	**Mean Age**	**56.4**	**57.3**	**0.537**
	Minimum Age	**20**	**29**	
	Maximum Age	**75**	**77**	
Gender	**Females**	**87 (49%)**	**40 (46%)**	**0.695**
	Males	**90 (51%)**	**47 (54%)**	
Body Mass Index [kg / m^2]	**Mean BMI**	**30.1**	**29.8**	**0.787**
	Minimum BMI	**18.5**	**18.2**	
	Maximum BMI	**53.1**	**51.0**	
Primary Diagnosis	**Avascular Necrosis**	**12 (7%)**	**4 (5%)**	**0.591**
	Developmental Dysplasia	**5 (3%)**	**1 (1%)**	**0.667**
	Epiphyseal Defect	**0 (0%)**	**2 (2%)**	**0.108**
	Osteoarthritis	**155 (88%)**	**78 (90%)**	**0.689**
	Post Traumatic Arthritis	**5 (3%)**	**2 (2%)**	**1.000**
Harris Hip Score	**Mean Pre-Op HH Score**	**50.6**	**50.7**	**0.960**
	Minimum Pre-Op HH Score	**21.0**	**26.0**	
	Maximum Pre-Op HH Score	**71.0**	**76.0**	
Harris Hip Pain Category (Range 0-44)	**Mean Pre-op HH Pain**	**14.3**	**13.6**	**0.265**
	Minimum Pre-op HH Pain	**10.0**	**10.0**	
	Maximum Pre-op HH Pain	**20.0**	**30.0**	
Harris Hip Function Score (Range 0-33)	**Mean Pre-op HH Function**	**20.0**	**19.8**	**0.785**
	Minimum Pre-op HH Function	**0.0**	**5.0**	
	Maximum Pre-op HH Function	**30.0**	**30.0**	
Harris Hip Activity Score (Range 0-14)	**Mean Pre-op HH Activity**	**8.2**	**8.7**	**0.127**
	Minimum Pre-op HH Activity	**2.0**	**1.0**	
	Maximum Pre-op HH Activity	**12.0**	**14.0**	
Harris Hip Deformity Score (Range 0-4)	**Mean Pre-op HH Deformity**	**3.5**	**3.8**	**0.107**
	Minimum Pre-op HH Deformity	**0.0**	**0.0**	
	Maximum Pre-op HH Deformity	**4.0**	**4.0**	
Harris Hip Range of Motion Score (Range 0-5)	**Mean Pre-op HH ROM**	**4.6**	**4.6**	**0.223**
	Minimum Pre-op HH ROM	**3.4**	**3.4**	
	Maximum Pre-op HH ROM	**5.0**	**5.0**	

The demographics of the 28mm COC Study subset cohort (patients who received an S-ROM femoral stem and Pinnacle 100 acetabular cup) study population are typical for a total hip replacement study performed in the U.S. and consistent with the demographics of the 28mm COC Study All Enrolled Cohort.

Comparisons were performed to determine whether the patient populations for the treatment groups were equivalent prior to study treatment. Comparisons were conducted using the **subset of patients from the** Safety Dataset with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups: means were compared with a t-test, and proportions were compared with Fisher's exact test. Results of these analyses are provided in **Table 6** below.

Table 6: Baseline Demographics for the 28mm COC Study Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

Demographic Element		Investigational N=45	Control N=24	Investigational vs. Control p-values
Enrollment	**Number of procedures**	**45**	**24**	**-**
	Number of patients	**45**	**24**	**-**
Age in years	**Mean Age**	**58.7**	**57.6**	**0.607**
	Minimum Age	**33**	**45**	
	Maximum Age	**75**	**75**	
Gender	**Females**	**19 (42%)**	**11 (46%)**	**0.803**
	Males	**26 (58%)**	**13 (54%)**	
Body Mass Index [kg / m^2]	**Mean BMI**	**27.3**	**27.8**	**0.683**
	Minimum BMI	**18.5**	**18.8**	
	Maximum BMI	**36.2**	**38.7**	
Primary Diagnosis	**Avascular Necrosis**	**1 (2%)**	**0 (0%)**	**1.000**
	Developmental Dysplasia	**1 (2%)**	**0 (0%)**	**1.000**
	Epiphyseal Defect	**0 (0%)**	**0 (0%)**	**-**
	Osteoarthritis	**43 (96%)**	**24 (100%)**	**0.540**
	Post Traumatic Arthritis	**0 (0%)**	**0 (0%)**	**-**
Harris Hip Score	**Mean Pre-Op HH Score**	**52.0**	**48.8**	**0.100**
	Minimum Pre-Op HH Score	**36.0**	**34.0**	
	Maximum Pre-Op HH Score	**66.0**	**63.0**	
Harris Hip Pain Category (Range 0-44)	**Mean Pre-op HH Pain**	**14.2**	**12.1**	**0.077**
	Minimum Pre-op HH Pain	**10.0**	**10.0**	
	Maximum Pre-op HH Pain	**20.0**	**20.0**	
Harris Hip Function Score (Range 0-33)	**Mean Pre-op HH Function**	**21.1**	**20.1**	**0.291**
	Minimum Pre-op HH Function	**10.0**	**7.0**	
	Maximum Pre-op HH Function	**27.0**	**24.0**	
Harris Hip Activity Score	**Mean Pre-op HH Activity**	**8.9**	**8.3**	**0.161**
	Minimum Pre-op HH Activity	**5.0**	**3.0**	

Demographic Element		Investigational N=45	Control N=24	Investigational vs. Control p-values
(Range 0-14	**Maximum Pre-op HH Activity**	**12.0**	**10.0**	
Harris Hip Deformity Score (Range 0-4)	**Mean Pre-op HH Deformity**	**3.1**	**3.5**	**0.333**
	Minimum Pre-op HH Deformity	**0.0**	**0.0**	
	Maximum Pre-op HH Deformity	**4.0**	**4.0**	
Harris Hip Range of Motion Score (Range 0-5)	**Mean Pre-op HH ROM**	**4.6**	**4.6**	**0.465**
	Minimum Pre-op HH ROM	**3.5**	**3.8**	
	Maximum Pre-op HH ROM	**5.0**	**5.0**	

C. 28mm COC Study Safety and Effectiveness Results

1. Safety Results

The analysis of safety was based on the following:

- Adverse Events
- Kaplan-Meier survivorship analysis of revisions

The analysis of safety was based on all 264 enrolled patients (177 investigational and 87 control cohorts) followed over the 24+ Month evaluation.

The key safety outcomes for this study are presented below in **Tables 7** through **20**.

Adverse events that occurred in the clinical study:

The Safety Dataset was used to compare:

1) Revisions,
2) Intraoperative complications,
3) Postoperative, systemic adverse events and
4) Postoperative, operative site adverse events

between investigational and control treatment groups.

a. Adverse Events by Patient

1. Revisions

Revision was defined as a reoperation where any component (acetabular or femoral) was removed or replaced. There were a total of 4 revisions (2.3%) reported out of 177 procedures in the investigational cohort and 2 revisions (2.3%) reported out of 87 procedures in the control cohort at 24+ months. **Table 7** provides a summary of the revision procedure, treatment group, age, gender, primary diagnosis, duration of implantation and reason for revision for each patient. There appears to be no clinically meaningful

difference in rates of revision between the investigational and control treatments.

Table 7: 28mm COC Study Investigational and Control Device Revisions

Revision Procedure(s): F = Femoral Stem S = Acetabular Shell H = Femoral Head I = Acetabular Insert	Treatment Group	Age / Gender	Primary Diagnosis	Duration of Implantation	Reason for Revision / Removal
S,I	Investigational	70 / M	Osteoarthritis	9 months	Deep infection diagnosed in operative hip
S, H, I	Investigational	57 / F	Osteoarthritis	18 months	Acetabular liner failure
F, H	Investigational	53 / M	Osteoarthritis	12 months	Femoral component loosening
F, H	Investigational	41 / M	Post-traumatic Arthritis	22 months	Stem revision due to patient fall
H, I	Control	68 / F	Osteoarthritis	20 months	Recurrent dislocations
H, I	Control	63 / M	Osteoarthritis	13 days	Recurrent dislocations

Kaplan-Meier Survivorship Analysis

Kaplan-Meier analyses were carried out to determine the expected rate of revision for any reason for both treatment groups. Revision was defined as a reoperation where any component (acetabular or femoral) was removed or replaced. The 'years' variable was calculated using time from surgery to revision for any reason. Patients not having a revision had their time calculated one of two ways: 1) time from surgery to last clinical or radiographic evaluation, or 2) time from surgery to death. Patients not having a revision had their time variable censored.

The results are presented graphically in **Figure 3** and in tabular form across time in **Table 8.** When revision was defined as the endpoint for survivorship, the results demonstrated a 97.6 % survivorship (95% confidence interval: 93.7%-99.1%) for the investigational patients at 3.2 years and a 97.6% survivorship (95% confidence interval: 90.9%-99.4%) for the control hips at 2.9 years. There was no clinically or statistically significant difference between investigational and control patients (log-rank p-value =0.992).

Figure 3: Kaplan-Meier Survivorship Estimates: 28mm COC Study, All Enrolled Cohort

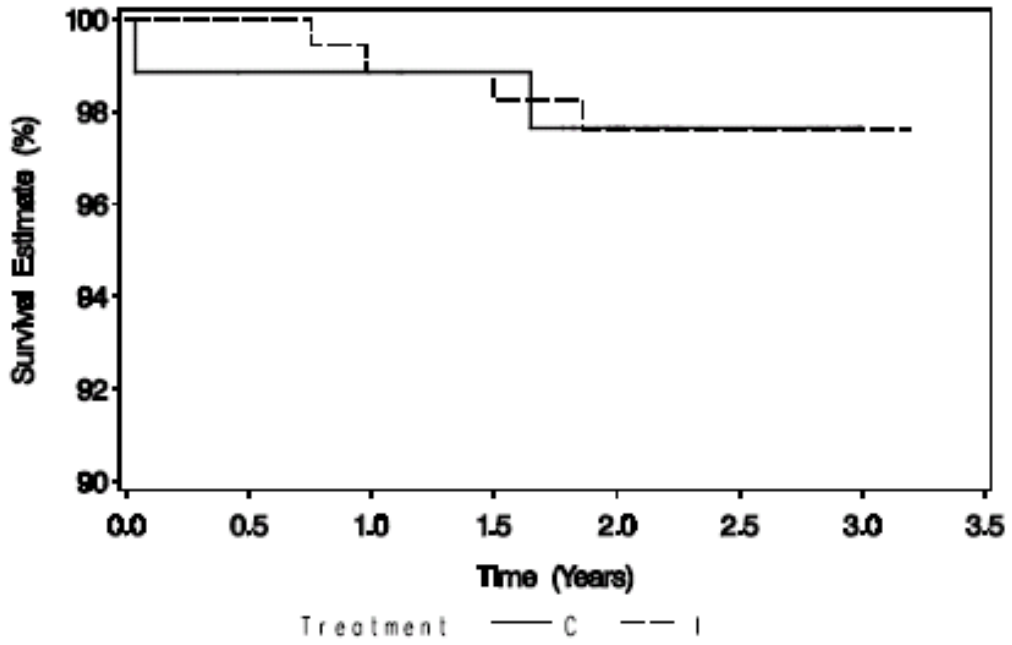
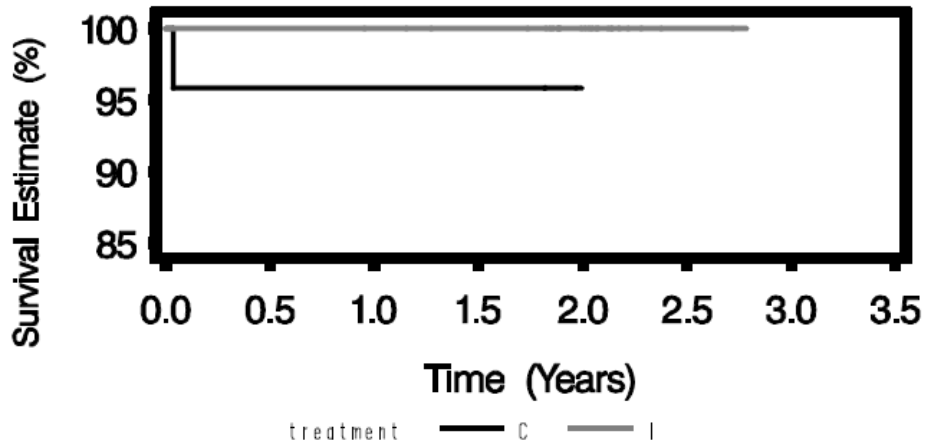


Table 8: Safety Dataset - Survival Estimates Across Time: 28mm COC Study, AllEnrolled Cohort

	Timecourse						
Treatment	**0 months**	**6 months**	**1 year**	**1.5 years**	**2 years**	**2.5 years**	**3 years**
Investigational: Survival Estimate	**100%**	**100%**	**98.9%**	**98.2%**	**97.6%**	**97.6%**	**97.6%**
Investigational: # Hips Remaining	**177**	**175**	**171**	**161**	**126**	**82**	**57**
Control: Survival Estimate	**100%**	**98.9%**	**98.9%**	**97.6%**	**97.6%**	**97.6%**	**97.6%**
Control: # Hips Remaining	**87**	**84**	**83**	**81**	**65**	**42**	**23**

Survivorship analyses for the Subset Cohort (patients who received S-ROM and Pinnacle 100 components only) are presented graphically in **Figure 4** and in tabular form across time in **Table 9**. Results for the Subset Cohort demonstrated a 100% survivorship (95% confidence interval: not evaluable because of no observed failures) for the investigational patients at 2.8 years and a 95.8% survivorship (95% confidence interval: 73.9%-99.4%) for the control hips at 2.0 years. There was no clinically or statistically significant difference between investigational and control patients (log-rank p-value =0.171). Note that the curves were terminated at the point where evaluable hips were equal to 20, due to the inaccuracy of survivorship beyond this point.

Figure 4: Kaplan-Meier Survivorship Estimates: 28mm COC Study, Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups



Event=Revision for any reason

Table 9: Safety Dataset - Survival Estimates Across Time: 28mm COC Study, Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

	Timecourse					
Treatment	**0 months**	**6 months**	**1 year**	**1.5 years**	**2 years**	**2.5 years**
Investigational: Survival Estimate	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Investigational: # Hips Remaining	**45**	**45**	**44**	**42**	**34**	**22**
Control: Survival Estimate	**100%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**
Control: # Hips Remaining	**24**	**23**	**23**	**23**	**20**	**15**

Adverse events reported from the clinical study of 264 hip procedures are listed in **Tables 10, 12, 14, 16,** and **18-20** below.

In **Tables 10** through **15** below, every unique adverse event was reported once per patient, regardless of whether a single patient reported more than one instance of a particular adverse event.

2. Intraoperative Complications

The most common intraoperative complication was femoral bone fracture, which was observed in 2.8% of investigational patients (5/177). There was no statistically or clinically meaningful difference in the proportions of observed intraoperative adverse

events across treatment groups (see **Table 10** below). Fisher's exact test was used to compare proportions across the two treatment groups.

Table 10: Comparison of Frequency of Intraoperative Adverse Events for the 28mm COC Study, All Enrolled Cohort

	Investigational N=177		Control N=87		
Adverse Events at the 24+ Endpoint	**AEs, (%)**	**95% Confidence Levels**	**AEs, (%)**	**95% Confidence Levels**	**p-value**
Fracture of Femur	5 (2.8%)	0.9 – 6.5	1 (1.1%)	0.0 – 6.2	0.667
Difficulty Seating Femoral Component	1 (0.6%)	0.0 – 3.1	1 (1.1%)	0.0 – 6.2	0.551
Nerve Damage	1 (0.6%)	0.0 – 3.1	0 (0.0%)	-	1.000
Hematological	1 (0.6%)	0.0 – 3.1	0 (0.0%)	-	1.000
Genitourinary	1 (0.6%)	0.0 – 3.1	0 (0.0%)	-	1.000
Musculoskeletal*	1 (0.6%)	0.0 – 3.1	0 (0.0%)	-	1.000
Liner Fracture During Surgery**,†	2 (1.1%)	0.1 – 4.0	0 (0.0%)	-	1.000
Difficulty Seating Liner w/o Fracture**	1 (0.6%)	0.0 – 3.1	0 (0.0%)	-	1.000
Difficulty Seating Liner**,†,‡	3 (1.7%)	0.3 – 4.8	0 (0.0%)	-	0.553
Dermatological	0 (0.0%)	-	1 (1.1%)	0.0 – 6.2	0.330
Blemish on Ceramic Component	0 (0.0%)	-	1 (1.1%)	0.0 – 6.2	0.330
Total	12 (6.8%)	-	4 (4.6%)	-	-

**** One investigational patient had related intraoperative complications reported: difficulty in broaching the femoral canal (musculoskeletal) and difficulty seating the femoral component.***
*****Three patients experienced difficulty seating the liner; 2 of these experienced a ceramic liner fracture upon attempted removal of the mal-positioned liner.***
† N = 178 for the investigational group, consisting of 177 enrolled investigational patients + 1 intent to treat patient who received a polyethylene liner subsequent to intraoperative ceramic liner fracture.
‡Difficulty Seating Liner includes 1 patient without fracture, which is also listed separately in this table.

There were three (3) intraoperative complications among patients in the S-ROM/Pinnacle 100 Subset Cohort of the 28mm COC Study, as presented in **Table 11** below. There

appears to be no clinically meaningful difference in rates of intraoperative adverse events between the investigational and control treatments.

Table 11: 28mm COC Study Comparison of Frequency of Intraoperative Adverse Events, Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

	Investigational N=45		Control N=24	
Adverse Events at the 24+ Month Endpoint	**AEs, (%)**		**AEs, (%)**	
Dermatological	0 (0.0%)		1 (4.2%)	
Liner Fracture During Surgery*,†	1 (2.2%)		0 (0.0%)	
Difficulty Seating Liner*,†	1 (2.2%)		0 (0.0%)	
Total	2(4.4%)		1 (4.2%)	

One patient experienced difficulty seating the liner, and also experienced a ceramic liner fracture upon attempted removal of the mal-positioned liner.

†N = 46 for the investigational group, consisting of 45 enrolled patients and 1 intent to treat patient who received a polyethylene liner subsequent to intraoperative ceramicliner fracture.

3. 28mm COC Study Postoperative-Systemic Adverse Events

For both the investigational and control treatments the most commonly reported postoperative systemic complication was musculoskeletal. Frequently reported adverse events also included: cardiovascular, genitourinary, gastrointestinal, respiratory, and dermatological.

There was no statistically or clinically meaningful difference in the proportion of postoperative systemic adverse events (see **Table 12** below).

Although no patient complaints about audible 'squeaking' throughout the 24+ months time course were reported, this study did not directly address this issue; therefore, this clinical concern cannot be reported on at this time.

Table 12: Comparison of Frequency of Postoperative Systemic Adverse Events: 28mm COC Study All Enrolled Cohort

	Investigational N=177			Control N=87			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Cancer	5	2.8	0.9 – 6.5	2	2.3	0.3 – 8.1	1.000
Cardiovascular	12	6.8	3.5 – 11.5	6	6.9	2.6 – 14.4	1.000
Central Nervous System	3	1.7	0.3 – 4.9	3	3.4	0.7 – 9.8	0.339
Dermatological	7	4.0	1.6 – 8.0	2	2.3	0.3 – 8.1	0.722
Endocrine/Metabolic	4	2.3	0.6 – 5.7	5	5.7	1.9 – 12.9	0.161
Gastrointestinal	9	5.1	2.3 – 9.4	5	5.7	1.9 – 12.9	0.779
Genitourinary	14	7.9	4.4 – 12.9	7	8.0	3.3 – 15.9	1.000
Heent	2	1.1	0.1 – 4.0	2	2.3	0.3 – 8.1	0.600
Hematological	3	1.7	0.3 – 4.9	4	4.6	1.3 – 11.4	0.223
Musculoskeletal	84	47.5	44.9 – 60.1	43	49.4	38.5 – 60.4	0.794
Neurological	2	1.1	0.1 – 4.0	0	0.0	-	1.000
Other*	13	7.3	4.0 – 12.2	7	8.0	3.3 – 15.9	0.810
Peripheral Nervous System	4	2.3	0.6 – 5.7	1	1.1	0.0 – 6.2	1.000
Psychological	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Respiratory System	9	5.1	2.3 – 9.4	4	4.6	1.3 – 11.4	1.000
Thrombosis / Thrombophlebitis	2	1.1	0.1 – 4.0	1	1.1	0.0 – 6.2	1.000

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'musculoskeletal', then 'musculoskeletal' was listed once for that hip. However, if that same hip also reported 'cancer', then that adverse event was listed in addition to the 'musculoskeletal' adverse event.

Additional Notes:

*** Frequency of Systemic AEs reported as "Other", Investigational:** Papular red erythema treated with hydrocortisone-1; Non-displaced patella treated with knee immobilizer-1; Bursitis treated with anti-inflammatories-2; ENNT (Pre-Glaucoma) treated with eye drops-1; Prophylactic antibiotics for dental procedure- 2; Fever that delayed discharge from hospital- 1; Weak and wobbly needing reassurance- 1; Cellulite left tibia prescribed antibiotic-1; Mild leg pain- 1; Non cardiac chest pain & degenerative disc disease- 1; Leakage of silicone breast implants and surgical removal of breast implants- 1. **Frequency of Systemic AEs reported as "Other", Control:** Prophylactic antibiotics for dental procedure- 4; Bursitis- 1; Lumbar spine and left knee pain/left knee arthroscopy and subject fall- 1; and Spider bite- 1.

For the 28mm COC Study Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups, the most frequent postoperative systemic adverse events were musculoskeletal, cardiovascular, genitourinary, and respiratory. There appears to be no clinically meaningful difference in rates of postoperative systemic adverse events between the investigational and control treatments (see **Table 13** below).

Table 13: Comparison of Frequency of Postoperative Systemic Adverse Events: 28mm COC Study Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

	Investigational N=45		Control N=24	
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**AEs**	**%**
Cardiovascular	2	4.4	1	4.2
Dermatological	0	0.0	1	4.2
Gastrointestinal	1	2.2	1	4.2
Genitourinary	2	4.4	2	8.3
HEENT	1	2.2	0	0.0
Hematological	0	0.0	2	8.3
Musculoskeletal	14	31.1	9	37.5
Neurological	1	2.2	0	0.0
Peripheral Nervous System	1	2.2	0	0.0
Psychological	1	2.2	0	0.0
Respiratory System	3	6.7	1	4.2

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'musculoskeletal', then 'musculoskeletal' was listed once for that hip. However, if that same hip also reported 'cardiovascular', then that adverse event was listed in addition to the 'musculoskeletal' adverse event.

4. 28mm COC Study Postoperative Operative Site Adverse Events

The most commonly reported postoperative operative site complications for investigational and control patients were wound problems and bursitis, respectively. Other complications included dislocation, muscle weakness, and end of stem pain. There appear to be no statistically or clinically meaningful differences in the proportions of postoperative operative site adverse events (see **Table 14** below).

Table 14: Comparison of Frequency of Postoperative Operative Site Adverse Events: 28mm COC Study, All Enrolled Cohort

	Investigational N=177			Control N=87			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Acetabular Liner Failure [1]	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Bone Lysis [2]	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Component Fracture[1]	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Deep Infection [2,3]	2	1.1	0.1 – 4.0	0	0.0	-	1.000
Dislocation [4]	5	2.8	0.9 – 6.5	4	4.6	1.3 – 11.4	0.483
Femoral Component Loosening [5]	3	1.7	0.3 – 4.9	0	0.0	-	0.553
Fracture [6]	2	1.1	0.1 – 4.0	0	0.0	-	1.000
Heterotopic Bone Formation	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Muscle Weakness	5	2.8	0.9 – 6.5	0	0.0	-	0.175
Other[7]	16	9.0	5.3 – 14.3	12	13.8	7.3 – 22.9	0.288
Other – Neurological[8]	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Other - Bursitis	6	3.4	1.3 – 7.2	5	5.7	1.9 – 12.9	0.513
Other – End Of Stem Pain	4	2.3	0.6 – 5.7	0	0.0	-	0.306
Other - Iliopsoas Tendonitis	1	0.6	0.0 – 3.1	0	0.0	-	1.000
Wound Problem[9]	9	5.1	2.4 – 9.4	2	2.3	0.3 – 8.1	0.349

	Investigational N=177			Control N=87			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'deep infection', then 'deep infection' was listed once for that hip. However, if that same hip also reported 'bone lysis', then that adverse event was listed in addition to the 'deep infection' adverse event.

Additional Notes:

1 This investigational patient was seen more than one time and the adverse event was initially reported as a component fracture and at the time of revision surgery was confirmed as an acetabular liner failure.

2 Bone lysis was reported secondary to deep infection for one patient.

3 Two investigational patients had deep infections. One patient had a resection arthroplasty. In the other subject, an I&D was performed and the components were retained.

4 Two control hips were revised to treat recurrent dislocations.

5 Two investigational hips were revised for loose femoral components. The acetabuli were retained.

6 **A greater trochanter fracture was reported for 1 investigational patient secondary to recurrent dislocations and this patient was treated with open reduction internal fixation.**

7 Frequency of Operative Site AEs reported as "Other", Investigational**: Blister treated with tagaderm-1; Groin pain secondary to slipping treated conservatively-1; Hematoma secondary to fall and trochanteric bursitis-1; Groin tendonitis treated with medications-1; muscle pain treated with medication- 1; leg swelling-1; general musculoskeletal treated with medications and hip pain after a fall-*2*; patient fell- 1; hip/thigh pain -1; adductor strain treated conservatively-1; patient trauma treated with reduced weight bearing and medications-1; warm incision-1; Hamstring tendonitis treated with physical therapy-1; calf pain, twisted knee and thigh/buttock pain treated with NSAIDs-1; and thigh pain treated with NSAIDS-1**. Frequency of Operative Site AEs reported as "Other", Control: **Mild serous drainage treated with dressing-1; patient trauma treated with reduced weight bearing-1; trochanteric tenderness treated with injection-1; hip pain-2; trochanteric bursitis treated with multiple injections-1; and thigh pain treated with continued strengthening-1; uneven leg length treated by reassuring patient-1; leg/calf pain-1; mid thigh pain treated with medications-1; one episode of clicking-1, iliopsoas tendonitis-1.**

8 **Frequency of Operative Site AE reported as "Other- Neurological",: Investigational: nerve damage causing footdrop treated with physical therapy, medications and a foot orthothic-1.**

9 **Wound problems were observed in the immediate postoperative period (0-6 weeks) except for 1 investigational case where the AE was observed between 12 and 24 months. All wound problems were treated conservatively with superficial treatment and/or antibiotics with the exception of 1 investigational patient that required a superficial I&D.**

For the 28mm COC Study Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups, the most frequent postoperative operative site adverse events were dislocation, muscle weakness and wound problems. There appear to be no clinically meaningful difference in rates of postoperative operative site adverse events between the investigational and control treatments (see **Table 15** below).

Table 15: Comparison of Frequency of Postoperative Operative Site Adverse Events: 28mm COC Study, Subset Cohort of Patients with S-ROM Femoral Stems and Pinnacle 100 Acetabular Cups

	Investigational N=45		Control N=24	
Adverse Events at the 24 month+ Endpoint	**AEs**	**%**	**AEs**	**%**
Dislocation[1]	2	4.4	1	4.8
Muscle Weakness	1	2.8	0	0.0
Other[2]	0	0.0	3	12.5
Wound Problem[3]	3	6.7	2	8.3

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'deep infection', then 'deep infection' was listed once for that hip. However, if that same hip also reported 'bone lysis', then that adverse event was listed in addition to the 'deep infection' adverse event**.**

Additional Notes:

1 One control hip was revised to treat recurrent dislocations.

2 **Frequency of Operative Site AEs reported as "Other", Control:** Mid thigh pain treated with medications-1; one episode of clicking-1, iliopsoas tendonitis-1.

3 Wound problems were observed in the immediate postoperative period (0-6 weeks). All wound problems were treated conservatively with superficial treatment and/or antibiotics.

b. Complications Grouped by Type of Adverse Event

There were no statistically or clinically meaningful significant differences in the proportions of adverse events grouped by type of AE (intraoperative, postoperative operative site, or systemic) or overall across investigational and control treatment groups in the 28mm COC Study All Enrolled Cohort (see **Table 16** below). Similarly, there appears to be no clinically meaningful differences in the AE rates for the Subset Cohort (see **Table 17** below). The total number of AEs grouped by type of AE (intraoperative, postoperative, operative site, or systemic) for the 28mm COC Study All Enrolled Cohort are reported in **Table 18**.

Table 16: Comparison of Frequencies of Any Adverse Event (Per Hip Basis): 28mm COC Study, All Enrolled Cohort

	Investigational N=177			Control N=87			
Adverse Events at 24+ Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Any Complication	**125**	**70.6**	**63.3 – 77.2**	**63**	**72.4**	**61.8 – 81.5**	**0.885**
Intraoperative	**10**	**5.6**	**2.7 – 10.1**	**3**	**3.4**	**0.7 – 9.8**	**0.555**
Operative Site	**38**	**21.5**	**15.7 – 28.3**	**19**	**21.8**	**13.7 – 32.0**	**1.000**
Systemic	**112**	**63.3**	**55.7 – 70.4**	**57**	**65.5**	**54.6 – 75.4**	**0.786**
Adverse events are reported on a per hip basis. Regardless of how many times a single hip had an intraoperative complication, for **example, it was only counted once.**							

Table 17: Comparison of Frequencies of Any Adverse Event (Per Hip Basis): 28mm COC Study, Subset Cohort

24+ Months	Investigational N=45		Control N=24	
Adverse Events	**AEs**	**%**	**AEs**	**%**
Any Complication	**24**	**53.3**	**15**	**62.5**
Intraoperative	**0**	**0.0**	**1**	**4.2**
Operative Site	**5**	**11.1**	**6**	**25.0**
Systemic	**20**	**44.4**	**12**	**50.0**
Adverse events are reported on a per hip basis. Regardless of how many times a single hip had an intraoperative complication, for example, it was only counted once.				

Table 18: Comparison of Frequencies of Any Adverse Event (All events): 28mm COC Study, All Enrolled Cohort

Adverse Events (distinct events)	Investigational N=177	Control N=87
Any Complication	342	162
Intraoperative	12	4
Operative Site	78	28
Systemic	252	130
In this table, adverse events are reported on a per event basis, so that adverse events which were reported multiple times for a single hip were counted each time.		

c. Distribution of Adverse Events over Time

In **Tables 19** and **20**, a time course of the occurrence of post-operative systemic and operative site adverse events is displayed. An adverse event may be reported more than once per patient in these tables if the adverse event occurred more than once across time.

Table 19: Time Course Occurrence of Postoperative Systemic Adverse Events: 28mm COC Study, All Enrolled Cohort

	Interval																	
	0D-6W		6 Week		6W-6M		6 Month		6M-12M		12 Month		12M-24M		24 Month+		Total	
Complication	C N	I N	C N	I N	C N	I N	C N	I N	C N	I N	C N	I N	C N	I N	C N	I N	C N	I N
CANCER						1				1	2				1	5	3	7
CARDIOVASCULAR	1	4				1	1	2			2	2		2	3	1	7	12
CENTRAL NERVOUS SYSTEM	1				1	1	1					1		1			3	3
DERMATOLOGICAL	2	1				4			1			2		2		1	3	10
ENDOCRINE/METABOLIC	1					1		1			1		1	1	2	2	5	5
GASTROINTESTINAL	2	4	1			3	1		1			2				2	5	11
GENITOURINARY	4	5				2	2	3		1		3		4	2	1	8	19
HEENT	1			1							1	1		1			2	3
HEMATOLOGICAL	4	1		1		1											4	3
MUSCULOSKELETAL	2	5	5	9	9	16	12	18	4	9	7	14	10	34	23	39	72	144
NEUROLOGICAL						1								1				2
PERIPHERAL NERVOUS SYSTEM						2							1	1		1	1	4
PSYCHOLOGICAL																1		1
RESPIRATORY SYSTEM	3	4				3	1	2		1				1			4	11
THROMBOSIS/THROMBOPHLEBITIS	1	1		1													1	2
OTHER	2	4	3	1	3		1	1			1	1	1	2	1	6	12	15
Total	24	29	9	13	13	36	19	27	6	12	14	26	13	50	32	59	130	252

Table 20: Time Course Occurrence of Postoperative Operative Site Adverse Events: 28mm COC Study, All Enrolled Cohort

	Interval																	
	0D-6W		6 Week		6W-6M		6 Month		6M-12M		12 Month		12M-24M		24 Month+		Total	
	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I
Complication	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
ACETABULAR LINER FAILURE														1				1
BONE LYSIS														1				1
COMPONENT FRACTURE														1				1
DEEP INFECTION		1								1								2
DISLOCATION	1	2	2	3		4			2			1	2		1	1	8	11
FEMORAL COMPONENT LOOSENING												1		1		2		4
FRACTURE				2				1										3
HETEROTOPIC BONE FORMATION								1										1
MUSCLE WEAKNESS		1		1		1		1						1				5
OTHER - BURSITIS						1	2			2	1	2	1		2	1	6	6
OTHER - END OF STEM PAIN				1				2		1								4
OTHER - ILIOPSOAS TENDONITIS																1		1
WOUND PROBLEM	2	7		3										1			2	11
OTHER	2	6	2	2	3	6	2	3	1		1	5		1	1	4	12	27
Total	5	17	4	12	3	12	4	8	3	4	2	9	3	7	4	9	28	78

2. Effectiveness Results, 28mm COC Study

The primary analysis was a non-inferiority test of the Harris Hip Score means as assessed at the minimum 24+ Month interval, with a 5 point non-inferiority margin, as defined in the study protocol. This primary analysis non-inferiority test was carried out on the 233 patients in the 24+Month dataset of the All Enrolled Cohort.

Marketing approval is for the S-ROM and Tri-Lock BPS femoral stems and Pinnacle 100 acetabular cup as components for the DePuy Ceramax™ Ceramic Total Hip System, information is presented for the All Enrolled Cohort as well the Subset Cohort (subjects who received the S-ROM/Pinnacle 100).

Primary Analysis

The Harris Hip Score mean in the All Enrolled Cohort for the investigational group was 94.4 while the Harris Hip Score mean for the control group was 93.8. The standard error of difference was 1.31, and the non-inferiority p-value was less than 0.001. These results are summarized in **Table 21** below.

Table 21: Comparison of 24+ Month Harris Hip Score Means: 28mm COC Study, All Enrolled Cohort

Parameter	Treatment	N	Least Square Means	Standard Error of Difference	Non-inferiority P-value
Harris Hip Score	I	152†	94.4	1.31	<0.001
	C	77	93.8		

† This analysis was carried out using an ANCOVA model where preoperative Harris Hip score was a significant covariate; 4 patients did not have a preoperative Total Harris Hip score on file, so the investigational group had a sample size of 152 in the final analysis. Non-inferiority results were similar (p-value < 0.001) when carried out with a t-test and full sample sizes of 156 in the investigational group and 77 in the control group.

The Harris Hip Score mean in the Subset Cohort for the investigational group was 97.5 while the Harris Hip Score mean for the control group was 94.7. The standard error of the difference was 1.99, and the non-inferiority p-value was less than 0.001. These results are summarized in **Table 22** below.

Table 22: Comparison of 24+ Month Harris Hip Score Means: 28mm COC Study, Subset Cohort

Parameter	Treatment	N	Least Square Means	Standard Error of Difference
Harris Hip Score	I	42	97.5	1.99
	C	23	94.7	

The primary analysis for the **28mm COC Study,** All Enrolled Cohort (and *post hoc* primary analysis for the Subset Cohort) demonstrate that the investigational group 24+Month Harris Hip score mean is non-inferior to the control group 24+Month Harris Hip score mean with a five (5) point non-inferiority margin.

Harris Hip Scores

In **Tables 23** and **24**, Harris Hip Scores at different time points are presented for the 28mm COC Study All Enrolled and Subset Cohorts, respectively.

Table 23: Timecourse of Harris Hip Scores and Subscores: 28mm COC Study, All Enrolled Cohort

	Interval																							
	Pre Op				6 Week				6 Month				12 Month				24 Month				24+ Month			
	I		C		I		C		I		C		I		C		I		C		I		C	
Total Score	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Excellent (91-100)	0	0	0	0	14	8.4	2	2.4	118	76.6	57	73.1	127	78.4	62	78.5	129	85.4	61	82.4	134	81.7	64	79
Good (81-90)	0	0	0	0	49	29.5	23	27.4	18	11.7	13	16.7	16	9.9	10	12.7	8	5.3	4	5.4	11	6.7	9	11.1
Fair (71-80)	2	1.1	1	1.1	48	28.9	33	39.3	7	4.5	4	5.1	10	6.2	2	2.5	5	3.3	3	4.1	5	3	5	6.2
Poor (<71)	171	96.6	86	98.9	48	28.9	25	29.8	11	7.1	4	5.1	9	5.6	5	6.3	9	6	6	8.1	13	7.9	3	3.7
Missing	4	2.3	0	0	7	4.2	1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	0	0
Total	177	100	87	100	166	100	84	100	154	100	78	100	162	100	79	100	151	100	74	100	164	100	81	100

Table 24: Timecourse of Harris Hip Scores and Subscores: 28mm COC Study, Subset Cohort

	Interval																							
	Pre Op				6 Week				6 Month				12 Month				24 Month				24+ Month			
	I		C		I		C		I		C		I		C		I		C		I		C	
Total Score	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Excellent (91-100)	0	0	0	0	3	7	1	4.5	28	80	17	81	36	87.8	19	86.4	30	85.7	15	83.3	38	90.5	20	87
Good (81-90)	0	0	0	0	16	37.2	8	36.4	4	11.4	2	9.5	3	7.3	1	4.5	2	5.7	1	5.6	3	7.1	1	4.3
Fair (71-80)	0	0	0	0	15	34.9	10	45.5	3	8.6	1	4.8	2	4.9	1	4.5	1	2.9	1	5.6	0	0	1	4.3
Poor (<71)	45	100	24	100	7	16.3	3	13.6	0	0	1	4.8	0	0	1	4.5	2	5.7	1	5.6	1	2.4	1	4.3
Missing	0	0	0	0	2	4.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	45	100	24	100	43	100	22	100	35	100	21	100	41	100	22	100	35	100	18	100	42	100	23	100

Secondary endpoint analyses related to radiographic assessment, revision rate, and Visual Analog Scale (VAS) scores. A patient was considered to be a composite success at 24+Months if the patient's 24+Month Harris Hip Score was greater than or equal to 80, if the patient was a radiographic success, and if the patient had not had a revision. The radiographic success, absence of revision, and overall success rates are reported for the 28mm COC Study All Enrolled Cohort in **Table 25**. The results demonstrate no clinically or statistically significant differences between investigational and control hips for radiographic success, absence of revision, or overall success in the 28mm COC Study All Enrolled Cohort.

Table 25: Comparison of Clinical Success, Radiographic Success and Revision: 28mm COC Study, All Enrolled Cohort

Patient Success Criteria	(I) 157 subjects	(C) 76 subjects	Fishers Exact p-value
Clinical Success	**138 / 157 (87.9%)**	**67 / 76 (88.2%)**	**1.000**
Total Harris Hip Score >= 80	138 / 157 (87.9%)	67 / 76 (88.2%)	1.000
Mild - Slight - No Pain	148 / 157 (94.3%)	71 / 76 (93.4%)	0.776
Radiographic Success	**153 / 157 (97.5%)**	**74 / 76 (97.4%)**	**1.000**
Radiolucencies <= 2mm	153 / 157 (97.5%)	74 / 76 (97.4%)	1.000
Acetabular Migration <= 4mm	153 / 157 (97.5%)	74 / 76 (97.4%)	1.000
Acetabular Inclination <= 4 Degrees	153 / 157 (97.5%)	74 / 76 (97.4%)	1.000
Osteolysis None	153 / 157 (97.5%)	74 / 76 (97.4%)	1.000
Absence of Revision	**153 / 157 (97.5%)**	**74 / 76 (97.4%)**	**1.000**
OVERALL SUBJECT SUCCESS RATE	**138 / 157 (87.9%)**	**67 / 76 (88.2%)**	**1.000**
There were 6 revisions (4I,2C) that did not meet the minimum 24-month follow-up criteria; these 6 revisions were counted as failures in all categories (clinical, radiographic, revision, and overall).			

Similarly, the radiographic success, absence of revision, and overall success rates are reported for the 28mm COC Study Subset Cohort in **Table 26**. The results demonstrate no clinically or statistically significant differences between investigational and control hips for radiographic success, absence of revision, or overall success in the 28mm COC Study Subset Cohort.

Table 26: Comparison of Clinical Success, Radiographic Success and Revision at 24+ Months: 28mm COC Study, Subset Cohort

Patient Success Criteria	(I) 41 subjects	(C) 22 subjects
Clinical Success	**40 / 41 (97.6%)**	**19 / 22 (86.4%)**
Total Harris Hip Score >= 80	40 / 41 (97.6%)	19 / 22 (86.4%)
Mild - Slight - No Pain	40 / 41 (97.6%)	19 / 22 (86.4%)
Radiographic Success	**41 / 41 (100.0%)**	**21 / 22 (95.5%)**
Radiolucencies <= 2mm	41 / 41 (100.0%)	21 / 22 (95.5%)
Acetabular Migration <= 4mm	41 / 41 (100.0%)	21 / 22 (95.5%)
Acetabular Inclination <= 4 Degrees	41 / 41 (100.0%)	21 / 22 (95.5%)
Osteolysis None	41 / 41 (100.0%)	21 / 22 (95.5%)
Absence of Revision	**41 / 41 (100.0%)**	**21 / 22 (95.5%)**
OVERALL SUBJECT SUCCESS RATE	**40 / 41 (97.6%)**	**19 / 22 (86.4%)**
There was 1 revision (0I,1C) that did not meet the minimum 24-month follow-up criteria; this 1 revision was counted as a failure in all categories (clinical, radiographic, revision, and overall).		

Patients were asked preoperatively and at follow-up visits to identify their level of pain on a visual analog scale. Specifically, a mark was placed on a line where one end denoted “NO PAIN” and the other denoted “SEVERE PAIN”. The location of the mark

on the line was proportionately converted to a 100 point scale with 0 denoting "NO PAIN" and 100 denoting "SEVERE PAIN". A presentation of VAS pain score means for the All Enrolled Cohort by treatment group over time is given in **Table 27**. The difference in means at 24+ Months was not significant (p = 0.324) as presented in **Table 28**.

Table 27: Timecourse of Visual Analog Scale Means: 28mm COC Study, All Enrolled Cohort

	Event Interval											
	Pre Op		6 Week		6 Month		12 Month		24 Month		24+ Month	
	VAS		VAS		VAS		VAS		VAS		VAS	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Treatment Type												
C	65.5	87	10.4	83	8.94	77	8.64	77	5.21	73	6.11	80
I	63.6	177	9.65	161	9.7	152	7.28	159	6.62	150	7.87	164

Table 28: Comparison of 24+ Month Visual Analog Scale Means: 28mm COC Study, All Enrolled Cohort

Parameter	Treatment	N	Means	Standard Error of Difference	t-test p-value
24+Month VAS Score	C	80	6.11	2.10	0.324
	I	164	7.87		

A presentation of VAS pain score means for the **28mm COC Study,** Subset Cohort by treatment group over time is given in **Table 29**. The difference in means at 24+ months was not significant (p=0.727) as presented in **Table 30**.

Table 29: Timecourse of Visual Analog Scale Means: 28mm COC Study, Subset Cohort

	Event Interval											
	Pre Op		6 Week		6 Month		12 Month		24 Month		24+ Month	
	VAS		VAS		VAS		VAS		VAS		VAS	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Treatment Type												
C	60.3	24	8.73	22	7.52	21	8.18	22	5.94	17	8.32	22
I	63.7	45	8.16	38	11.7	33	4.59	41	9.62	34	9.95	42

Table 30: Comparison of 24+Month VAS Score Means: 28mm COC Study, Subset Cohort

Parameter	Treatment	N	Means	Standard Error of Difference	t-test p-value
24+Month VAS Score	C	22	8.32	4.66	0.727
	I	42	9.95		

Conclusions Drawn from the 28mm COC Study Data

The clinical data support the reasonable assurance of safety and effectiveness of the 28mm DePuy Ceramax™ Ceramic Total Hip System when used in accordance with the indications for use and indicated population. It is reasonable to conclude that the benefits of the use of the 28mm DePuy Ceramax™ Ceramic Total Hip System for the target population outweighs the risk of surgery when used in accordance with the direction for use.

Results for the 36mm COC Study

COC36 Data collected from April 2006 to March 2011 and COP28 data collected from October 2003 to March 2011 were used for the approval of the 36mm DePuy Ceramax™ Ceramic Total Hip System.

Note: The control group was comprised of 74 COP28 control subjects from the 28mm COC Study who had received a 52mm or larger acetabular shell, since these are the sizes that were large enough to have accommodated a 36mm DePuy Ceramax Ceramic Hip System.

Subset Cohort of S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups:

Marketing approval was obtained for the S-ROM and Summit Porocoat femoral stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) acetabular cups as components for the 36mm DePuy Ceramax™ Ceramic Total Hip System.

Among the 242 patients enrolled in the 36mm COC IDE study, 138 received an S-ROM or Summit Porocoat/Pinnacle 100 or Sector II combination. Various analyses were carried out on this 36mm Subset Cohort in addition to analyses on all enrolled subjects.

A. Accountability of 36mm COC Study Cohort

At the time of database lock for this 36mm COC IDE study, 90% (150/167) of the investigational patients and 96% (68/71) of the control patients had radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF at the completion of the study, the 24-month or later postoperative visit, for the evaluation of the safety and effectiveness of this device. This is summarized in **Table 31** below.

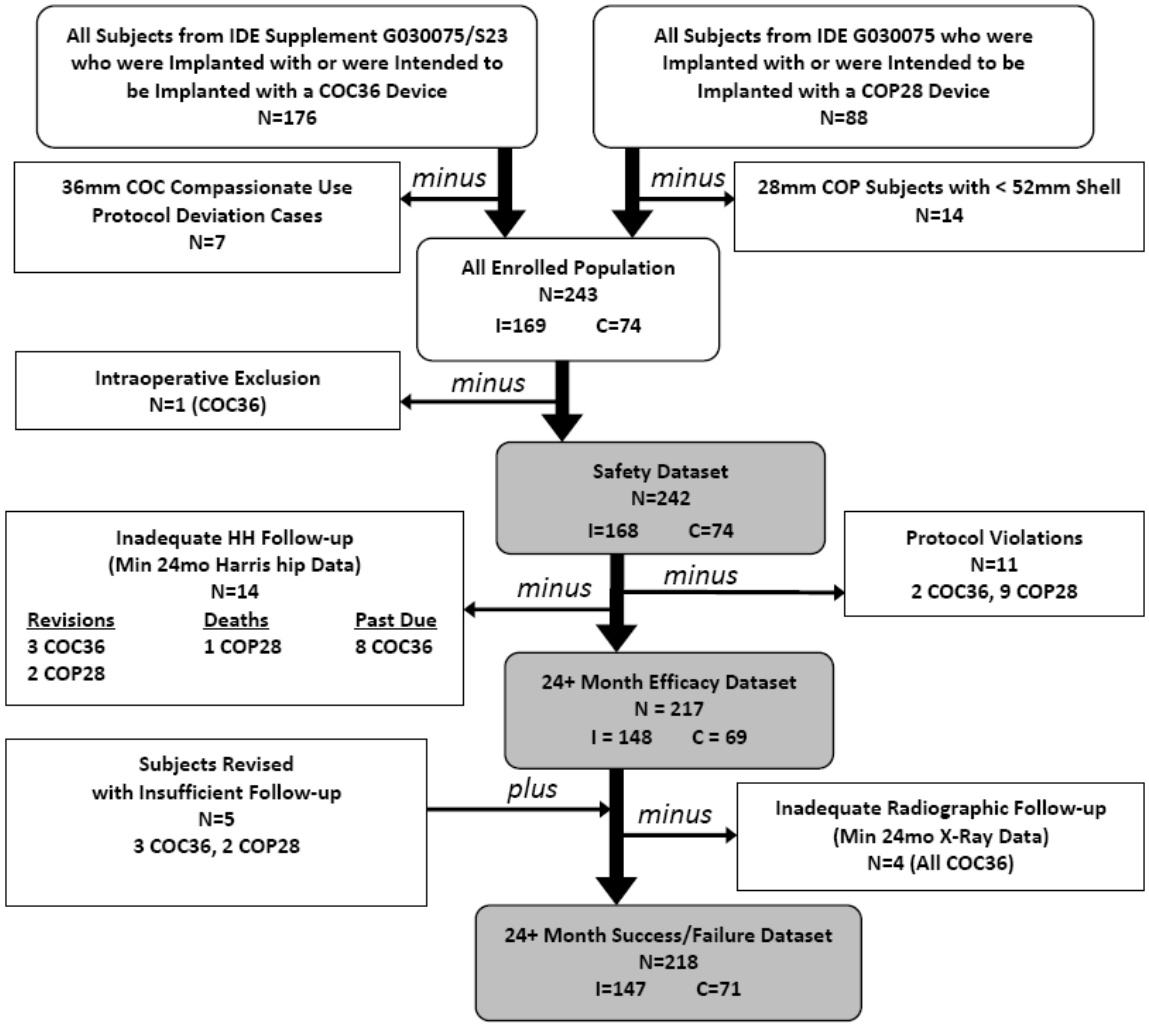
Table 31: Patient Accounting for the All Enrolled Cohort, 36mm COC Study

IDE Study Cohort	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	I	C	I	C	I	C	I	C	I	C	I	C
Theoretical Due	168	74	168	74	168	74	168	74	168	74	168	74
Expected Due	168	74	168	73	168	72	168	72	167	71	167	71
Withdrawn: Deaths (Cumulative)	0	0	0	0	0	1	0	1	0	1	0	1
Withdrawn: Components Removed/Revised (Cumulative)	0	0	0	1	0	1	0	1	1	2	3	2
Withdrawn: Consent (Cumulative)	0	0	0	0	0	0	0	0	0	0	0	1
Actual	168	74	163	69	141	65	151	67	131	61	150	68
%Follow-up = Actual / Expected Due	100%	100%	97%	95%	84%	90%	90%	93%	78%	86%	90%	96%

Theoretical Due: **The number of implants that have entered the beginning of each interval window at the time of database lock.**
Expected Due: **Theoretical due patients with complete follow-up minus study withdrawals for death or revision.**
% Follow-up: **% of hips with radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF.**
Withdrawn: Consent (Cumulative)**: does not include patients who withdrew consent after complete 24 Month+ data had been obtained.**

Figure 5 below is a dataset flowchart which shows all COC36 and COP28 enrolled subjects, how the 242 patients in the 36mm COC Study Safety Dataset were obtained, and the order in which they were excluded, from top to bottom, to obtain the 24+ Month Efficacy and the 24+ Month Success/Failure datasets; revisions were retained for composite success analysis regardless of exclusion criteria. The primary endpoint non-inferiority test of 24+ Month HH mean scores was carried out on the 24+ Month Efficacy Dataset.

Figure 5: Patient Accounting Dataset Flowchart: 36mm COC Study, All Enrolled Cohort



Subset Cohort of 36mm COC Study Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

The primary analysis was based on six femoral stem types and two acetabular cup types. Marketing approval was obtained for the S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) acetabular cups as components for the 36mm DePuy Ceramax™ Ceramic Total Hip System. At the time of database lock, 89 investigational and 38 control patients in the 36mm Subset Cohort of patients with these components had a scorable (complete) Harris Hip CRF and a complete radiographic CRF at the 24-month or later postoperative visit. This is summarized in **Table 32** below.

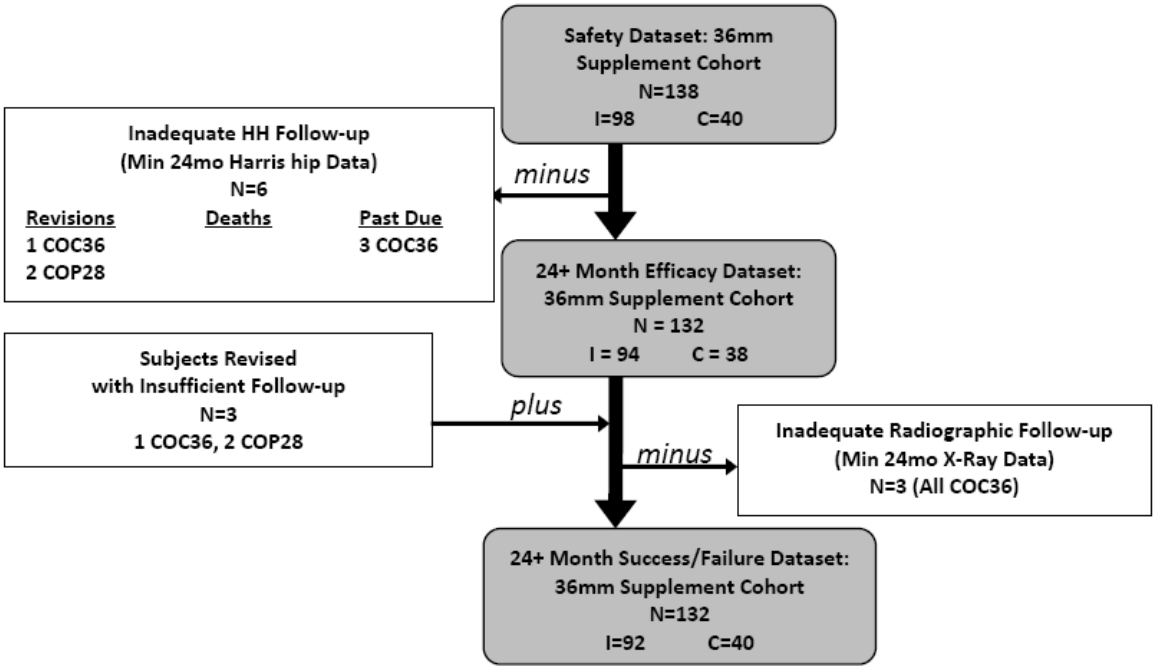
Table 32: Patient Accounting for the 36mm COC Study, Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

36mm Subset Cohort	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	I	C	I	C	I	C	I	C	I	C	I	C
Theoretical Due	98	40	98	40	98	40	98	40	98	40	98	40
Expected Due	98	40	98	39	98	39	98	39	98	38	98	38
Withdrawn: Deaths (Cumulative)	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn: Components Removed/Revised (Cumulative)	0	0	0	1	0	1	0	1	0	2	1	2
Withdrawn: Consent (Cumulative)	0	0	0	0	0	0	0	0	0	0	0	0
Actual	98	40	94	37	83	36	87	37	77	32	89	38
%Follow-up = Actual / Expected Due	100%	100%	96%	95%	85%	92%	89%	95%	79%	84%	91%	100%

Theoretical Due: **The number of implants that have entered the beginning of each interval window at the time of database lock.**
Expected Due: **Theoretical due patients with complete follow-up minus study withdrawals for death or revision.**
% Follow-up: **% of hips with radiographs, a scorable (complete) Harris Hip CRF and a complete radiographic CRF.**
Withdrawn: Consent (Cumulative)**: does not include patients who withdrew consent after complete 24 Month+ data had been obtained.**

Figure 6 below is a dataset flowchart which shows all 138 36mm COC Study subjects with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups in the Safety Dataset, and the order in which they were excluded, from top to bottom, in order to obtain the 36mm Subset Cohort of patients in the Efficacy Dataset and in the Success/Failure Dataset; revisions were retained for composite success, regardless of exclusion criteria.

Figure 6: 36mm COC Study Patient Accounting Dataset Flowchart: Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups



B. 36mm COC Study Population Demographics and Baseline Parameters

The demographics of the 36mm COC Study population are typical for a total hip replacement study performed in the U.S. Clinical study data was collected on 242 hips implanted. There were 168 investigational hip implantations and 74 control hip implantations in the Protocol Defined Safety Dataset for the All Enrolled Cohort.

Comparisons were performed to determine whether the patient populations for the treatment groups were equivalent prior to study treatment. Comparisons were conducted using the Safety Dataset: means were compared with a t-test, and proportions were compared with Fisher's exact test. Results of these analyses are provided in **Table 33** below.

Table 33: 36mm COC Study Baseline Demographics for the Safety Dataset

Demographic Element		Investigational N=168	Control N=74	Investigational vs. Control p-values
Enrollment	**Number of procedures**	**168**	**74**	**-**
	Number of patients	**168**	**74**	**-**
Age in years	**Mean Age**	**57.3**	**56.9**	**0.781**
	Minimum Age	**24**	**29**	
	Maximum Age	**75**	**74**	
Gender	**Females**	**76 (45%)**	**27 (36%)**	**0.259**
	Males	**92 (55%)**	**47 (64%)**	

Demographic Element		Investigational N=168	Control N=74	Investigational vs. Control p-values
Body Mass Index [kg / m^2]	**Mean BMI**	**29.0**	**29.9**	**0.318**
	Minimum BMI	**18.4**	**18.8**	
	Maximum BMI	**51.1**	**47.1**	
Primary Diagnosis	**Avascular Necrosis**	**13 (8%)**	**4 (5%)**	**0.597**
	Developmental Dysplasia	**3 (2%)**	**1 (1%)**	**1.000**
	Epiphyseal Defect	**2 (1%)**	**2 (3%)**	**0.588**
	Osteoarthritis	**148 (88%)**	**65 (88%)**	**1.000**
	Post Traumatic Arthritis	**2 (1%)**	**2 (3%)**	**0.588**
Harris Hip Score	**Mean Pre-Op HH Score**	**52.9**	**52.1**	**0.564**
	Minimum Pre-Op HH Score	**18.0**	**26.0**	
	Maximum Pre-Op HH Score	**70.0**	**76.0**	
Harris Hip Pain Category (Range 0-44)	**Mean Pre-op HH Pain**	**14.9**	**14.1**	**0.252**
	Minimum Pre-op HH Pain	**0.0**	**10.0**	
	Maximum Pre-op HH Pain	**20.0**	**30.0**	
Harris Hip Function Score (Range 0-33)	**Mean Pre-op HH Function**	**20.9**	**20.6**	**0.702**
	Minimum Pre-op HH Function	**2.0**	**5.0**	
	Maximum Pre-op HH Function	**30.0**	**30.0**	
Harris Hip Activity Score (Range 0-14)	**Mean Pre-op HH Activity**	**8.6**	**8.9**	**0.373**
	Minimum Pre-op HH Activity	**0.0**	**1.0**	
	Maximum Pre-op HH Activity	**14.0**	**14.0**	
Harris Hip Deformity Score (Range 0-4)	**Mean Pre-op HH Deformity**	**3.9**	**3.7**	**0.332**
	Minimum Pre-op HH Deformity	**0.0**	**0.0**	
	Maximum Pre-op HH Deformity	**4.0**	**4.0**	
Harris Hip Range of Motion Score (Range 0-5)	**Mean Pre-op HH ROM**	**4.6**	**4.6**	**0.652**
	Minimum Pre-op HH ROM	**0.0**	**3.4**	
	Maximum Pre-op HH ROM	**5.0**	**5.0**	

The demographics of the 36mm Supplement Cohort (patients who received S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 and Sector II Acetabular Cups) study population are typical for a total hip replacement study performed in the U.S. and consistent with the demographics of all subjects in the **36mm COC Study**.

Comparisons were performed to determine whether the patient populations for the treatment groups were equivalent prior to study treatment. Comparisons were conducted using the subset of patients from the Safety Dataset with S-ROM and Summit Porocoat

Femoral Stems and Pinnacle 100 and Sector II Acetabular Cups: means were compared with a t-test, and proportions were compared with Fisher's exact test. Results of these analyses are provided in **Table 34** below.

Table 34: Baseline Demographics for the 36mm COC Study Subset Cohort of Safety Dataset Subjects with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

Demographic Element		Investigational N=45	Control N=24	Investigational vs. Control p-values
Enrollment	**Number of procedures**	**98**	**40**	**-**
	Number of patients	**98**	**40**	**-**
Age in years	**Mean Age**	**58.1**	**58.5**	**0.849**
	Minimum Age	**32**	**39**	
	Maximum Age	**75**	**74**	
Gender	**Females**	**32 (33%)**	**13 (33%)**	**1.000**
	Males	**66 (67%)**	**27 (68%)**	
Body Mass Index [kg / m^2]	**Mean BMI**	**29.3**	**30.3**	**0.406**
	Minimum BMI	**18.4**	**18.8**	
	Maximum BMI	**49.5**	**45.9**	
Primary Diagnosis	**Avascular Necrosis**	**4 (4%)**	**0 (0%)**	**0.323**
	Developmental Dysplasia	**0 (0%)**	**0 (0%)**	**1.000**
	Epiphyseal Defect	**0 (0%)**	**0 (0%)**	**1.000**
	Osteoarthritis	**93 (95%)**	**40 (100%)**	**0.321**
	Post Traumatic Arthritis	**1 (1%)**	**0 (0%)**	**1.000**
Harris Hip Score	**Mean Pre-Op HH Score**	**51.6**	**49.7**	**0.347**
	Minimum Pre-Op HH Score	**18.0**	**26.0**	
	Maximum Pre-Op HH Score	**70.0**	**68.0**	
Harris Hip Pain Category (Range 0-44)	**Mean Pre-op HH Pain**	**14.2**	**13.0**	**0.211**
	Minimum Pre-op HH Pain	**0.0**	**10.0**	
	Maximum Pre-op HH Pain	**20.0**	**20.0**	
Harris Hip Function Score (Range 0-33)	**Mean Pre-op HH Function**	**20.4**	**19.6**	**0.436**
	Minimum Pre-op HH Function	**2.0**	**5.0**	
	Maximum Pre-op HH Function	**30.0**	**27.0**	
Harris Hip Activity Score (Range 0-14	**Mean Pre-op HH Activity**	**8.6**	**8.7**	**0.735**
	Minimum Pre-op HH Activity	**2.0**	**2.0**	
	Maximum Pre-op HH Activity	**14.0**	**14.0**	
Harris Hip Deformity Score (Range 0-4)	**Mean Pre-op HH Deformity**	**3.8**	**3.6**	**0.429**
	Minimum Pre-op HH Deformity	**0.0**	**0.0**	
	Maximum Pre-op HH Deformity	**4.0**	**4.0**	

Demographic Element		Investigational N=45	Control N=24	Investigational vs. Control p-values
Harris Hip Range of Motion Score (Range 0-5)	**Mean Pre-op HH ROM**	**4.6**	**4.6**	**0.555**
	Minimum Pre-op HH ROM	**0.9**	**3.8**	
	Maximum Pre-op HH ROM	**5.0**	**5.0**	

C. 36mm COC Study Safety and Effectiveness Results

1. Safety Results

The analysis of safety was based on the following:

- Adverse Events
- Kaplan-Meier survivorship analysis of revisions

The analysis of safety was based on all 242 enrolled patients (168 investigational and 74 control cohorts) followed over the 24+ Month evaluation.

The key safety outcomes for this study are presented below in **Tables 35** through **50**.

Adverse events that occurred in the clinical study:

The Safety Dataset was used to compare:

1) Revisions,
2) Intraoperative complications,
3) Postoperative, systemic adverse events and
4) Postoperative, operative site adverse events

between investigational and control treatment groups.

a. Adverse Events by Patient

1. Revisions

Revision was defined as a reoperation where any component (acetabular or femoral) was removed or replaced. There were a total of 3 revisions (1.8%) reported out of 168 procedures in the investigational cohort and 2 revisions (2.7%) reported out of 74 procedures in the control cohort at 24+ months. **Table 35** provides a summary of the revision procedure, treatment group, age, gender, primary diagnosis, duration of implantation and reason for revision for each patient. There appears to be no clinically meaningful difference in rates of revision between the investigational and control treatments.

Table 35: 36mm COC Study Investigational and Control Device Revisions

Revision Procedure(s): F = Femoral Stem S = Acetabular Shell H = Femoral Head I = Acetabular Insert	Treatment Group	Age / Gender	Primary Diagnosis	Duration of Implantation	Reason for Revision / Removal
H, I	COC36	26/F	Avascular Necrosis	3.53 yrs	Deep infection
H, I	COC36	59/F	Osteo-arthritis	1.67 yrs	Ceramic liner fracture observed on radiograph
1st revision: F, H (0.58 years), Subject not withdrawn from study 2nd revision: S, I (2.92 years)	COC36	52/M	Osteo-arthritis	0.58 yrs	Femoral component loosening (revised at 0.58 years); Acetabular component loosening (revised/withdrawn at 2.92 years)
H, I	COP28	68 / F	Osteoarthritis	20 months	Recurrent dislocations
H, I	COP28	63 / M	Osteoarthritis	13 days	Recurrent dislocations

Kaplan-Meier Survivorship Analysis

Kaplan-Meier analyses were carried out to determine the expected rate of revision for any reason for both treatment groups. Revision was defined as a reoperation where any component (acetabular or femoral) was removed or replaced. The 'years' variable was calculated using time from surgery to revision for any reason. Patients not having a revision had their time calculated one of two ways: 1) time from surgery to last clinical or radiographic evaluation, or 2) time from surgery to death. Patients not having a revision had their time variable censored.

The results are presented graphically in **Figure 7** and in tabular form across time in **Table 36.** When revision was defined as the endpoint for survivorship, the results demonstrated a 97.5 % survivorship (95% confidence interval: 91.9%-99.2%) for the investigational patients at 4.1 years and a 97.3% survivorship (95% confidence interval: 89.6%-99.3%) for the control hips 5.6 years. There was no clinically or statistically significant difference between investigational and control patients (log-rank p-value =0.734).

Survivorship analyses for the Subset Cohort (patients who received S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 and Sector II Acetabular Cup) are presented graphically in **Figure 8** and in tabular form across time in **Table 37**. Results for the Subset Cohort demonstrated a 99%

survivorship (95% confidence interval: 92.8%-99.9%) for the investigational patients at 4.1 years and a 95.0% survivorship (95% confidence interval: 81.5%-98.7%) for the control hips at 5.2 years. There was no clinically or statistically significant difference between investigational and control patients (log-rank p-value =0.153).

Figure 7: Kaplan-Meier Survivorship Estimates: 36mm COC Study, Safety Dataset

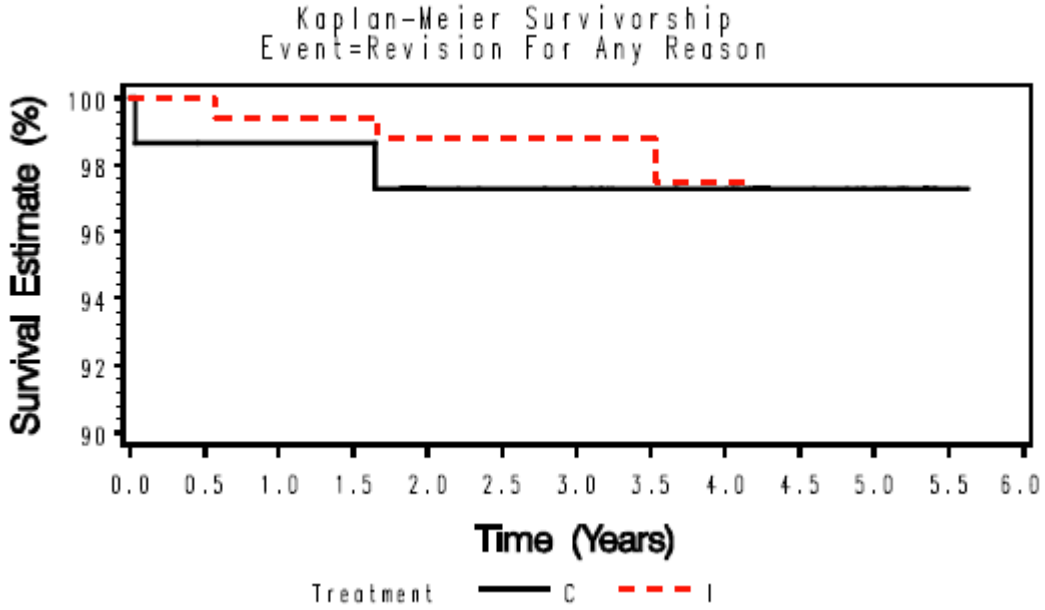


Figure 8: Kaplan-Meier Survivorship Estimates: 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

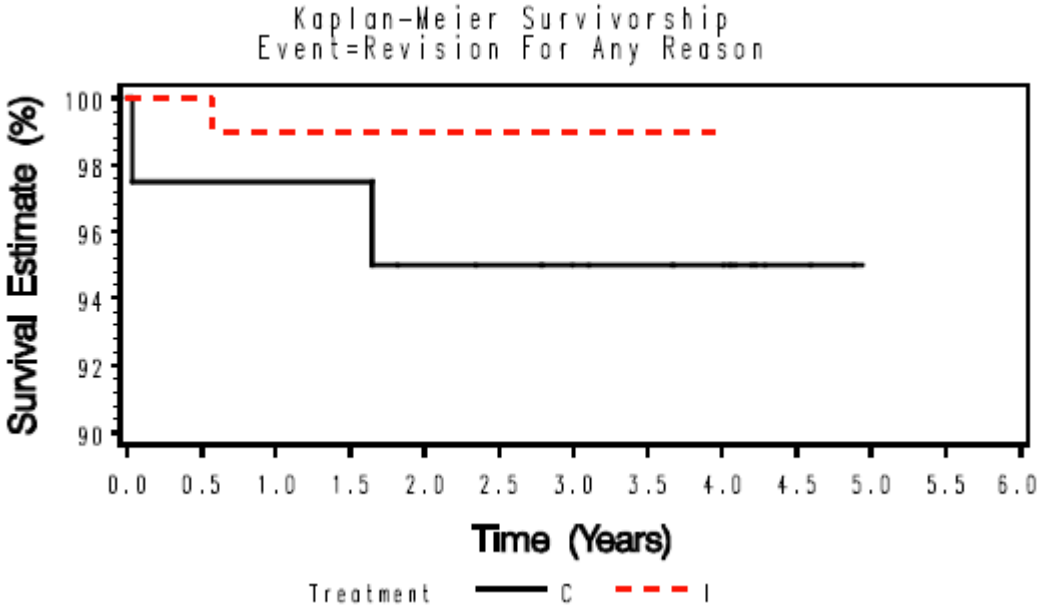


Table 36: Safety Dataset - Survival Estimates Across Time: 36mm COC Study, Safety Dataset

Treatment		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
C	Survival Estimate	100.0	98.6	98.6	98.6	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	
C	Lower 95% Confidence Limit	100.0	90.8	90.8	90.8	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	
C	Upper 95% Confidence Limit	100.0	99.8	99.8	99.8	99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.3	
C	Hips Remaining	74	72	72	72	67	65	60	55	53	42	36	21	<20
C	Accumulative Hips Revised	0	1	1	1	2	2	2	2	2	2	2	2	2
I	Survival Estimate	100.0	100.0	99.4	99.4	98.8	98.8	98.8	98.8	97.5				
I	Lower 95% Confidence Limit	100.0	100.0	95.8	95.8	95.2	95.2	95.2	95.2	91.9				
I	Upper 95% Confidence Limit	100.0	100.0	99.9	99.9	99.7	99.7	99.7	99.7	99.2				
I	Hips Remaining	168	166	162	159	152	133	126	78	52	<20			
I	Cumulative Hips Revised	0	0	1	1	2	2	2	2	3	3			

Table 37: Survival Estimates Across Time: 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

Treatment		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5
C	Survival Estimate	100.0	97.5	97.5	97.5	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
C	Lower 95% Confidence Limit	100.0	83.5	83.5	83.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	
C	Upper 95% Confidence Limit	100.0	99.6	99.6	99.6	98.7	98.7	98.7	98.7	98.7	98.7	98.7	
C	Hips Remaining	40	39	39	39	37	36	33	32	30	23	20	<20
C	Accumulative Hips Revised	0	1	1	1	2	2	2	2	2	2	2	2
I	Survival Estimate	100.0	100.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0			
I	Lower 95% Confidence Limit	100.0	100.0	92.8	92.8	92.8	92.8	92.8	92.8	92.8			
I	Upper 95% Confidence Limit	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.9	99.9			
I	Hips Remaining	98	96	94	94	92	84	78	41	24	<20		
I	Cumulative Hips Revised	0	0	1	1	1	1	1	1	1	1		

Adverse events reported from the clinical study of 242 hip procedures are listed in **Tables 38, 40, 42, 44, and 46 – 50** below.

In **Tables 38** through **43** below, every unique adverse event was reported once per patient, regardless of whether a single patient reported more than one instance of a particular adverse event.

2. Intraoperative Complications

The most common intraoperative complication was cardiovascular, which was observed in 1.2% of investigational patients (2/168). There was no statistically or clinically meaningful difference in the proportions of observed intraoperative adverse events across treatment groups (see **Table 38** below). Fisher's exact test was used to compare proportions across the two treatment groups.

Table 38: Comparison of Frequency of Intraoperative Adverse Events for the 36mm COC Study, Safety Dataset

	Investigational N=168		Control N=74		
Adverse Events at the 24+ Endpoint	**AEs, (%)**	**95% Confidence Levels**	**AEs, (%)**	**95% Confidence Levels**	**p-value**
2cm non-displaced fracture of posterior femoral neck	1 (0.6%)	0.0 – 3.3	0 (0.0%)	-	1.000
Blemish on Ceramic Component	0 (0.0%)	-	1 (1.4%)	0.0 – 7.3	0.306
Broken Drill Bit	1 (0.6%)	0.0 – 3.3	0 (0.0%)	-	1.000
Cardiovascular	2 (1.2%)	0.1 – 4.2	0 (0.0%)	-	1.000
Hematological	1 (0.6%)	0.0 – 3.3	0 (0.0%)	-	1.000
Liner Fracture During Surgery†	1 (0.6%)	0.0 – 3.3	0 (0.0%)	-	1.000
Total†	**6 (3.6%)**	**1.3 – 7.6**	**1 (1.4%)**	**0.0 – 7.3**	**0.679**

† N=168 investigational subjects + 1 subject who received a metal-on-metal system subsequent to intraoperative ceramic liner fracture.

There were five (5) intraoperative complications among patients in the subset cohort of subjects with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) acetabular cups, as presented in **Table 39** below.

There appears to be no clinically meaningful difference in rates of intraoperative adverse events between the investigational and control treatments.

Table 39: 36mm COC Study Comparison of Frequency of Intraoperative Adverse Events, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

	Investigational N=98		Control N=40	
Adverse Events at the 24+ Month Endpoint	**AEs, (%)**		**AEs, (%)**	
2cm non-displaced fracture of posterior femoral neck	1 (1.0%)		0 (0.0%)	
Broken Drill Bit	1 (1.0%)		0 (0.0%)	
Cardiovascular	2 (2.0%)		0 (0.0%)	
Hematological	1 (1.0%)		0 (0.0%)	
Total	5 (5.1%)		0 (0.0%)	

3. 36mm COC Study Postoperative-Systemic Adverse Events

The most commonly reported postoperative systemic complication reported for investigational subjects was musculoskeletal. Other frequently reported adverse events included: cardiovascular, genitourinary, gastrointestinal, dermatological, and HEENT.

There were no systemic adverse events that occurred with a higher incidence in the COC36 investigational group with statistical significance. The Hematological adverse event rate was significantly higher in the COP28 control group compared to the COC36 investigational group (see **Table 40** below).

Table 40: Comparison of Frequency of Postoperative Systemic Adverse Events: 36mm COC Study Safety Dataset

	Investigational N=168			Control N=74			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Cancer	4	2.4	0.6 - 6.0	3	4.1	0.8 - 11.4	0.440
Cardiovascular	15	8.9	5.1 - 14.3	6	8.1	3.0 - 16.8	1.000
Central Nervous System	6	3.6	1.3 - 7.6	4	5.4	1.5 - 13.3	0.500
Dermatological	8	4.8	2.1 - 9.2	0	0.0	0.0 - 0.0	0.111
Endocrine/Metabolic	4	2.4	0.6 - 6.0	6	8.1	3.0 - 16.8	0.072
Gastrointestinal	8	4.8	2.1 - 9.2	6	8.1	3.0 - 16.8	0.371
Genitourinary	10	6.0	2.9 - 10.7	7	9.5	3.9 - 18.5	0.413
HEENT	7	4.2	1.7 - 8.4	6	8.1	3.0 - 16.8	0.225
Hematological	0	0.0	0.0 - 0.0	4	5.4	1.5 - 13.3	0.008
Musculoskeletal	93	55.4	47.5 - 63.0	44	59.5	47.4 - 70.7	0.576
Neurological	3	1.8	0.4 - 5.1	0	0.0	0.0 - 0.0	0.555
Other – Fell	5	3.0	1.0 - 6.8	3	4.1	0.8 - 11.4	0.703
Other – Insect bite	0	0.0	0.0 - 0.0	1	1.4	0.0 - 7.3	0.306
Other - Pregnancy - 7 Months Gestation	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Peripheral Nervous System	4	2.4	0.6 - 6.0	3	4.1	0.8 - 11.4	0.440
Respiratory System	4	2.4	0.6 - 6.0	4	5.4	1.5 - 13.3	0.253
Thrombosis/Thrombophlebitis	5	3.0	1.0 - 6.8	1	1.4	0.0 - 7.3	0.670
Wound Problem	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'musculoskeletal', then 'musculoskeletal' was listed once for that hip. However, if that same hip also reported 'cancer', then that adverse event was listed in addition to the 'musculoskeletal' adverse event.

The most frequent postoperative systemic adverse events for investigational subjects in the 36mm COC Study subset cohort of subjects with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) acetabular cups, were musculoskeletal, cardiovascular, gastrointestinal, HEENT, central nervous system, and genitourinary.

There were no systemic adverse events in the subset cohort that occurred with a higher incidence in the COC36 investigational group with statistical significance. The Hematological adverse event rate was significantly higher in the COP28 control group compared to the COC36 investigational group (see **Table 41** below).

Table 41: Comparison of Frequency of Postoperative Systemic Adverse Events: 36mm COC Study Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

	Investigational N=98		Control N=40	
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**AEs**	**%**
Cancer	2	2.0	1	2.5
Cardiovascular	11	11.2	4	10.0
Central Nervous System	5	5.1	3	7.5
Dermatological	3	3.1	0	0.0
Endocrine/Metabolic	1	1.0	3	7.5
Gastrointestinal	6	6.1	3	7.5
Genitourinary	4	4.1	5	12.5
HEENT	6	6.1	1	2.5
Hematological	0	0.0	3	7.5
Musculoskeletal	53	54.1	27	67.5
Neurological	1	1.0	0	0.0
Other – Fell	3	3.1	1	2.5
Other – Insect bite	0	0.0	1	2.5
Peripheral Nervous System	2	2.0	2	5.0
Respiratory System	2	2.0	3	7.5
Thrombosis/Thrombophlebitis	2	2.0	0	0.0

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'musculoskeletal', then 'musculoskeletal' was listed once for that hip. However, if that same hip also reported 'cardiovascular', then that adverse event was listed in addition to the 'musculoskeletal' adverse event.

4. 36mm COC Study Postoperative Operative Site Adverse Events

The most commonly reported postoperative operative site complications for investigational subjects were Trochanteric Bursitis, Musculoskeletal, Other – Squeaking, Pain, and Other – Clicking, Other – Iliopsoas Tendinitis, Pain: Thigh, and Wound Problem, respectively. There were no specific postoperative-operative site adverse events that occurred with a statistically significant higher proportion in COC36 investigational subjects. (see **Table 42** below).

Table 42: Comparison of Frequency of Postoperative Operative Site Adverse Events: 36mm COC Study, Safety Dataset

	Investigational N=168			Control N=74			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Acetabular Component Failure[1]	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Acetabular Liner Failure[2]	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Deep Infection	2	1.2	0.1 - 4.2	0	0.0	0.0 - 0.0	1.000
Dermatological	3	1.8	0.4 - 5.1	0	0.0	0.0 - 0.0	0.555
Dislocation	2	1.2	0.1 - 4.2	4	5.4	1.5 - 13.3	0.073
Femoral Component Loosening[3]	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Fracture – Femoral Insertional FX[4]	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Hematoma Requiring Drainage	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Heterotopic Bone Formation	3	1.8	0.4 - 5.1	0	0.0	0.0 - 0.0	0.555
Muscle Weakness	4	2.4	0.6 - 6.0	0	0.0	0.0 - 0.0	0.316
Musculoskeletal	16	9.5	5.5 - 15.0	3	4.1	0.8 - 11.4	0.197
Other – Clicking	7	4.2	1.7 - 8.4	1	1.4	0.0 - 7.3	0.441
Other – Contusion	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Other – Fell	3	1.8	0.4 - 5.1	0	0.0	0.0 - 0.0	0.555
Other – Hip Pain	2	1.2	0.1 - 4.2	1	1.4	0.0 - 7.3	1.000
Other – Hip Snapping	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Other – Iliopsoas Tendinitis	6	3.6	1.3 - 7.6	3	4.1	0.8 - 11.4	1.000
Other – Squeaking	8	4.8	2.1 - 9.2	0	0.0	0.0 - 0.0	0.111
Other – Stiffness	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Other – Subsidence of Femoral Component	0	0.0	0.0 - 0.0	1	1.4	0.0 - 7.3	0.306
Other – Vibration	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Pain	8	4.8	2.1 - 9.2	2	2.7	0.3 - 9.4	0.728

	Investigational N=168			Control N=74			
Adverse Events at the 24+ Month Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Pain: Thigh	6	3.6	1.3 - 7.6	3	4.1	0.8 - 11.4	1.000
Subluxation	1	0.6	0.0 - 3.3	0	0.0	0.0 - 0.0	1.000
Trochanteric Bursitis	17	10.1	6.0 - 15.7	4	5.4	1.5 - 13.3	0.323
Wound Problem	6	3.6	1.3 - 7.6	1	1.4	0.0 - 7.3	0.679

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'deep infection', then 'deep infection' was listed once for that hip. However, if that same hip also reported 'trochanteric bursitis', then that adverse event was listed in addition to the 'deep infection' adverse event.

Additional Notes:

1 This AE was documented for the 52 year old male Subject who had acetabular components revised at 2.92 years post-op (this Subject's second revision).

2 This AE was documented for the 59 year old female Subject who was revised for an acetabular liner fracture at 1.67 years post-op.

3 This AE was documented for the 52 year old male Subject who had femoral components revised at 0.58 years post-op (this Subject's first revision; the Subject was not withdrawn from the study because acetabular components were not revised).

4 A femoral fracture diagnosed one month after index THA; date of onset was stated as the date of index THA. The investigator indicated that the AE was not directly related to the device. The recommended treatment was protected weight bearing for 6 weeks.

For the 36mm COC Study Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups, the most frequent postoperative operative site adverse events were Trochanteric Bursitis, Musculoskeletal, Pain, Pain: Thigh, Heterotopic Bone Formation, Muscle Weakness, and Other - Squeaking. There were no specific postoperative-operative site adverse events that occurred with a statistically significant higher proportion in COC36 investigational subjects (see **Table 43** below).

Table 43: Comparison of Frequency of Postoperative Operative Site Adverse Events: 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

	Investigational N=98		Control N=40	
Adverse Events at the 24 month+ Endpoint	**AEs**	**%**	**AEs**	**%**
Acetabular Component Failure[1]	1	1.0	0	0.0
Deep Infection	1	1.0	0	0.0
Dermatological	2	2.0	0	0.0
Dislocation	2	2.0	2	5.0
Femoral Component Loosening[2]	1	1.0	0	0.0
Hematoma Requiring Drainage	1	1.0	0	0.0
Heterotopic Bone Formation	3	3.1	0	0.0
Muscle Weakness	3	3.1	0	0.0
Musculoskeletal	7	7.1	2	5.0
Other – Clicking	2	2.0	1	2.5
Other – Contusion	1	1.0	0	0.0
Other – Fell	1	1.0	0	0.0
Other – Hip Pain	0	0.0	1	2.5
Other – Iliopsoas Tendinitis	2	2.0	2	5.0
Other – Squeaking	3	3.1	0	0.0
Other – Stiffness	1	1.0	0	0.0
Other – Subsidence of Femoral Component	0	0.0	1	2.5
Other – Vibration	1	1.0	0	0.0
Pain	4	4.1	2	5.0
Pain: Thigh	4	4.1	2	5.0
Subluxation	1	1.0	0	0.0
Trochanteric Bursitis	13	13.3	3	7.5

Every unique adverse event was reported once, regardless of whether a single hip reported more than one instance of a particular adverse event. For example, if a hip reported 'deep infection', then 'deep infection' was listed once for that hip. However, if that same hip also reported 'trochanteric bursitis', then that adverse event was listed in addition to the 'deep infection' adverse event.

Additional Notes:

1 This AE was documented for the 52 year old male Subject who had acetabular components revised at 2.92 years post-op (this Subject's second revision).

2 This AE was documented for the 52 year old male Subject who had femoral components revised at 0.58 years post-op (this Subject's first revision; the Subject was not withdrawn from the study because acetabular components were not revised).

There were no specific postoperative-operative site adverse events that occurred with a statistically significant higher proportion in

COC36 investigational subjects, for either the entire Safety Dataset or the Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups. However, it was observed that in total there were 18 noise related postoperative-operative site adverse events (clicking, snapping, squeaking, or vibration) reported in 15 COC36 and 1 COP28 Safety Dataset subjects. Some of these noise related AEs were deemed by the respective sites to be related to the device, and some were not, as displayed in **Table 44** below. All but one of the 12 device related noise AEs (reported in 11 COC36 subjects) were deemed by the respective investigators to be 'Mild' in severity; one instance of squeaking was reported to be 'Moderate' in severity. All but one of these 11 subjects stated satisfaction with their THA at the most recent 24+ month follow-up, and all of these 11 subjects had a 24+ month Harris Hip score of 84 or higher (six had a 100).

Table 44: Distribution of Device Related vs. Not Device Related (as determined by the sites) Postoperative Operative Site Noise Adverse Events: 36mm COC Study, Safety Dataset

	OTHER-CLICKING	OTHER-HIP SNAPPING	OTHER-SQUEAKING*	OTHER-VIBRATION
Possibly Device Related	3 COC36		8 COC36	1 COC36
Not Device Related	4 COC36, 1 COP28	1 COC36		

*Note: After database lock, one further subject was reported to have squeaking in the study hip, for a total of 9 COC36 AEs related to squeaking. Out of these 9 hips, squeaking was only reproducible in 2 during clinical follow-up.

The sponsor acknowledges that post-operative operative site noise related adverse events that are possibly related to the COC36 investigational device occurred with a higher frequency in the COC36 investigational group than in the COP28 control group, but considers these adverse events to be mild in severity, particularly given the clinical, pain, and satisfaction outcomes of the patients that exhibited these adverse events.

b. Complications Grouped by Type of Adverse Event

When AEs were grouped by type of AE (intraoperative, postoperative operative site, or systemic) for subjects in the 36mm COC Stud**y** All Enrolled Cohort, there was a greater proportion of subjects with postoperative-operative site AEs in the investigational group (p-value = 0.018); there was no significant difference in the proportions of hips with systemic, intraoperative, or overall AEs across treatment groups (see **Table 45** below). In the Subset Cohort of Patients with S-ROM

and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups, there was not a significant difference in the proportions of hips with AEs in any category (overall, intraoperative, postoperative-operative site, or post-operative systemic; **Table 46** below). The total number of AEs grouped by type of AE (intraoperative, postoperative, operative site, or systemic) for the 36mm COC Study All Enrolled Cohort Safety Dataset are reported in **Table 47**.

Table 45: Comparison of Frequencies of Any Adverse Event (Per Hip Basis): 36mm COC Study, Safety Dataset

	Investigational N=168			**Control N=74**			
Adverse Events at 24+ Endpoint	**AEs**	**%**	**95% Confidence Levels**	**AEs**	**%**	**95% Confidence Levels**	**p-value**
Any Complication	134	79.8	72.9 - 85.6	60	81.1	70.3 - 89.3	0.863
Intraoperative*	5	3.0	1.0 - 6.8	1	1.4	0.0 - 7.3	0.670
Operative Site	66	39.3	31.9 - 47.1	17	23.0	14.0 - 34.2	0.018
Systemic	117	69.6	62.1 - 76.5	52	70.3	58.5 - 80.3	1.000

Adverse events are reported on a per hip basis. Regardless of how many times a single hip had an intraoperative complication, for **example, it was only counted once.**

*** The intraoperative AE tally presented in this table does not include one subject who received a metal-on-metal system subsequent to intraoperative ceramic liner fracture.**

Table 46: Comparison of Frequencies of Any Adverse Event (Per Hip Basis): 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

24+ Months	Investigational N=98		Control N=40	
Adverse Events	**AEs**	**%**	**AEs**	**%**
Any Complication	78	79.6	33	82.5
Intraoperative	5	5.1	0	0.0
Operative Site	36	36.7	10	25.0
Systemic	70	71.4	30	75.0

Adverse events are reported on a per hip basis. Regardless of how many times a single hip had an intraoperative complication, for example, it was only counted once.

Table 47: Comparison of Frequencies of Any Adverse Event (All events): 36mm COC Study, Safety Dataset

Adverse Events (distinct events)	Investigational N=168	Control N=74
Any Complication	417	237
Intraoperative	5	1
Operative Site	133	40
Systemic	279	196

In this table, adverse events are reported on a per event basis, so that adverse events which were reported multiple times for a single hip were counted each time.

In order to understand the slightly higher proportion of post-operative operative site AEs in the investigational group, the sponsor examined those AEs which were deemed by the sites to be possibly device related, and those which were deemed by the sites not to be device related. **Table 48** below presents the number of subjects who experienced post-operative operative site adverse events which were deemed by the sites to be possibly device related, and also adverse events which were deemed to be not device related.

Table 48: Subjects with Device Related vs. Not Device Related (as determined by the sites) Postoperative Operative Site Adverse Events: 36mm COC Study, Safety Dataset

Adverse Events at 24+m Endpoint	Investigational N=168		Control N = 74		Fisher's Exact test p-value
	Subjects	Percent	Subjects	Percent	
OPERATIVE SITE: Device Related	16	9.5	4	5.4	0.325
OPERATIVE SITE: Not Device Related	61	36.3	16	21.6	0.025

Out of the 16 COC36 investigational subjects who were deemed to have experienced device related post-operative operative site adverse events, 11 experienced noise related adverse events. The sponsor attributes the disproportion in reported non-device related AEs to an increased rigor in investigator training and monitoring at the start of the 36mm arm of the study, and concludes that with the exception of noise related AEs, there is not a significant difference across treatment groups in the proportions of subjects who experienced adverse events for reasons attributable to the COC36 investigational device.

c. Distribution of Adverse Events over Time

In **Tables 49** and **50**, a time course of the occurrence of post-operative systemic and operative site adverse events is displayed. An adverse event may be reported more than once per patient in these tables if the adverse event occurred more than once across time.

Table 49: Time Course Occurrence of Postoperative Systemic Adverse Events: 36mm COC Study, Safety Dataset

	Interval																	
	0D-6W		6 Week		6W-6M		6 Month		6M-12M		12 Month		12M-24M		24 month+		Total	
	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C
Complication	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
CANCER											1	1	1		2	3	4	4
CARDIOVASCULAR	7	1						1			2	1	2		7	3	18	6
CENTRAL NERVOUS SYSTEM	3	1				1		1							4	1	7	4
DERMATOLOGICAL	2		2		1						2				1		8	
ENDOCRINE/METABOLIC											1	1	1	1	2	3	4	5
GASTROINTESTINAL	2	1	1	1	1			1		1	1				3	3	8	7
GENITOURINARY	2	3			2		1	2	1				1		5	3	12	8
HEENT		1	1	2	1			1			2	1			4	1	8	6
HEMATOLOGICAL		4																4
MUSCULOSKELETAL	6	3	3	4	11	7	18	8	11	3	12	8	20	12	75	56	156	101
NEUROLOGICAL			1												2		3	
OTHER - FELL														1	5	1	5	2
OTHER - INSECT BITE																1		1
OTHER - PREGNANCY - 7 MONTHS GESTATION															1		1	
PERIPHERAL NERVOUS SYSTEM	1		1					1					2	1		1	4	3
RESPIRATORY SYSTEM	1	3	2					1					1				4	4
THROMBOSIS/THROMBOPHLEBITIS		1			2								1		2		5	1
WOUND PROBLEM	1																1	
Total	25	18	11	7	18	8	19	16	12	4	21	12	29	15	113	76	248	156

Table 50: Time Course Occurrence of Postoperative Operative Site Adverse Events: 36mm COC Study, Safety Dataset

	Interval																	
	0D-6W		6 Week		6W-6M		6 Month		6M-12M		12 Month		12M-24M		24 month+		Total	
	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C	I	C
Complication	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
ACETABULAR COMPONENT FAILURE															1		1	
ACETABULAR LINER FAILURE													1				1	
DEEP INFECTION															1		1	
DERMATOLOGICAL	2												1				3	
DISLOCATION		3		1					2	2				2	1	5	3	13
FRACTURE - FEMORAL INSERTIONAL FX	1																1	
HEMATOMA REQUIRING DRAINAGE	1																1	
HETEROTOPIC BONE FORMATION			1		1										1		3	
MUSCLE WEAKNESS	2				1										1		4	
MUSCULOSKELETAL	5		3	1	3		3	1	1						1		16	2
OTHER - CLICKING					1	1			1		1				4		7	1
OTHER - CONTUSION													1				1	
OTHER - FELL					2		1										3	
OTHER - HIP PAIN										1					2		2	1
OTHER - HIP SNAPPING					1												1	
OTHER - ILIOPSOAS TENDINITIS									1				1		8	2	10	2
OTHER - SQUEAKING							2				2				7		11	
OTHER - STIFFNESS									1								1	
OTHER - SUBSIDENCE OF FEMORAL COMPONENT																2		2
OTHER - VIBRATION															1		1	
PAIN	1		1		2	2			2				1		2		9	2
PAIN: THIGH			1		1			2	1		2				2	1	7	3
SUBLUXATION															2		2	
TROCHANTERIC BURSITIS					5		1	1	1	1	3		3		4	2	17	4
WOUND PROBLEM	4	1	2														6	1
Total	16	4	8	2	17	3	7	4	10	4	8		8	2	38	12	112	31

2. Effectiveness Results, 36mm COC Study

The primary analysis was a non-inferiority test of the Harris Hip Score means as assessed at the minimum 24+ Month interval, with a 5 point non-inferiority margin, as defined in the study protocol. This primary analysis non-inferiority test was carried out on the 217 patients in the 24+Month Efficacy dataset of the All Enrolled Cohort.

Marketing approval is for the S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups as components for the DePuy Ceramax™ Ceramic Total Hip System;

information is presented for the All Enrolled Cohort as well the Subset Cohort (subjects who received S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups).

Primary Analysis

The Harris Hip Score mean in the All Enrolled Cohort for the investigational group was 95.6 while the Harris Hip Score mean for the control group was 94.9. The standard error of difference was 1.24, and the non-inferiority p-value was less than 0.001. These results are summarized in **Table 51** below.

Table 51: Comparison of 24+ Month Harris Hip Score Means: 36mm COC Study, 24+ Month Efficacy Dataset

Parameter	Treatment	N	Least Square Means†	Standard Error of Difference	Non-inferiority P-value
Harris Hip Score	COC36	148	95.6	1.24	< 0.001
	COP28	69	94.9		

† ***This analysis was carried out using an ANCOVA model where preoperative Harris Hip score and weight were significant covariates.***

The Harris Hip Score mean in the Subset Cohort for the investigational group was 95.5 while the Harris Hip Score mean for the control group was 95.3. The standard error of the difference was 1.54, and the non-inferiority p-value was less than 0.001. These results are summarized in **Table 52** below.

Table 52: Comparison of 24+ Month Harris Hip Score Means: 36mm COC Study, 24+ Month Efficacy Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

Parameter	Treatment	N	Least Square Means†	Standard Error of Difference	Non-inferiority P-value
Harris Hip Score	COC36	94	95.5	1.54	< 0.001
	COP28	38	95.3		

† ***This analysis was carried out using an ANCOVA model where weight was a significant covariate.***

The primary analysis for the **36mm COC Study,** 24+ Month Efficacy Datsaset (and *post hoc* primary analysis for the Subset Cohort) demonstrate that the investigational group 24+Month Harris Hip score mean is non-inferior to the control group 24+Month Harris Hip score mean with a five (5) point non-inferiority margin.

Harris Hip Scores

In **Tables 53** and **54**, Harris Hip Scores at different time points are presented for the 36mm COC Study All Enrolled and Subset Cohorts, respectively.

Table 53: Timecourse of Harris Hip Scores and Subscores: 36mm COC Study, Safety Dataset

	Interval																							
	Pre Op				6 Week				6 Month				12 Month				24 Month				24+ Month			
	I		C		I		C		I		C		I		C		I		C		I		C	
Total Score	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Excellent (91-100)	0	0.0	0	0.0	15	9.1	2	2.8	110	75.3	51	77.3	134	87.6	55	82.1	115	84.6	53	86.9	133	83.6	59	83.1
Good (81-90)	0	0.0	0	0.0	43	26.1	21	29.6	19	13.0	8	12.1	10	6.5	8	11.9	11	8.1	1	1.6	10	6.3	4	5.6
Fair (71-80)	0	0.0	1	1.4	54	32.7	26	36.6	5	3.4	3	4.5	5	3.3	1	1.5	7	5.1	2	3.3	6	3.8	3	4.2
Poor (<71)	168	100	73	98.6	52	31.5	21	29.6	11	7.5	3	4.5	4	2.6	3	4.5	3	2.2	5	8.2	8	5.0	3	4.2
Missing	0	0.0	0	0.0	1	0.6	1	1.4	1	0.7	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	2	1.3	2	2.8
Total	168	100	74	100	165	100	71	100	146	100	66	100	153	100	67	100	136	100	61	100	159	100	71	100

Table 54: Timecourse of Harris Hip Scores and Subscores: 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

	Interval																							
	Pre Op				6 Week				6 Month				12 Month				24 Month				24+ Month			
	I		C		I		C		I		C		I		C		I		C		I		C	
Total Score	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Excellent (91-100)	0	0.0	0	0.0	10	10.5	2	5.3	60	72.3	28	75.7	78	89.7	32	86.5	65	81.3	29	90.6	80	84.2	33	86.8
Good (81-90)	0	0.0	0	0.0	27	28.4	17	44.7	13	15.7	4	10.8	5	5.7	1	2.7	8	10.0	0	0.0	6	6.3	3	7.9
Fair (71-80)	0	0.0	0	0.0	32	33.7	11	28.9	3	3.6	1	2.7	2	2.3	1	2.7	5	6.3	1	3.1	4	4.2	1	2.6
Poor (<71)	98	100	40	100	26	27.4	8	21.1	7	8.4	3	8.1	2	2.3	3	8.1	2	2.5	2	6.3	4	4.2	1	2.6
Missing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.7	0	0.0	0	0.0	0	0.0	0	0.0	1	1.1	0	0.0
Total	98	100	40	100	95	100	38	100	83	100	37	100	87	100	37	100	80	100	32	100	95	100	38	100

Secondary endpoint analyses were related to radiographic assessment, revision rate, and Visual Analog Scale (VAS) scores. A patient was considered to be a composite success at 24+Months if the patient's 24+Month Harris Hip Score was greater than or equal to 80, if the patient was a radiographic success, and if the patient had not had a revision. The radiographic success, absence of revision, and overall success rates are reported for the 36mm COC Study 24+ Month Success/Failure Dataset in **Table 55**. The results demonstrate no clinically or statistically significant differences between investigational and control hips for radiographic success, absence of revision, or overall success in the 36mm COC Study 24+ Month Success/Failure Dataset.

Table 55: Comparison of Clinical Success, Radiographic Success and Revision: 36mm COC Study, 24+ Month Success/Failure Dataset

Patient Success Criteria	COC36 147 subjects	COP28 71 subjects	Fishers Exact p-value
*Clinical Success(at 24+ months)	134 / 147 (91.2%)	64 / 71 (90.1%)	0.8060
*Total Harris Hip Score >= 80	134 / 147 (91.2%)	64 / 71 (90.1%)	0.8060
*Mild - Slight - No Pain	136 / 147 (92.5%)	68 / 71 (95.8%)	0.5565
*Radiographic Success(at 24+ months)	143 / 147 (97.3%)	69 / 71 (97.2%)	1.0000
*Radiolucencies <= 2mm	143 / 147 (97.3%)	69 / 71 (97.2%)	1.0000
*Acetabular Migration <= 4mm	144 / 147 (98.0%)	69 / 71 (97.2%)	0.6616
*Acetabular Inclination <= 4 Degrees	144 / 147 (98.0%)	69 / 71 (97.2%)	0.6616
*Osteolysis None	144 / 147 (98.0%)	69 / 71 (97.2%)	0.6616
Absence of Revision	144 / 147 (98.0%)	69 / 71 (97.2%)	0.6616
OVERALL COMPOSITE SUCCESS RATE	**133 / 147 (90.5%)**	**64 / 71 (90.1%)**	**1.0000**

* Subjects who were revised were also considered to be clinical and radiographic failures, The denominator of 147 COC36 subjects includes 3 revised subjects who did not reach the 24-Month study endpoint but are shown in this table to be clinical and radiographic failures, and the denominator of 71 COP28 subjects includes 2 revised subjects who did not reach the 24-Month study endpoint but are shown in this table to be clinical and radiographic failures.

Similarly, the radiographic success, absence of revision, and overall success rates are reported in **Table 56** for the 36mm COC Study 24+ Month Success/Failure Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups. The results demonstrate no clinically or statistically significant differences between investigational and control hips for radiographic success, absence of revision, or overall success in the 36mm COC Study Subset Cohort.

Table 56: Comparison of Clinical Success, Radiographic Success and Revision at 24+ Months: 36mm COC Study, 24+ Month Success/Failure Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

Patient Success Criteria	COC36 92 subjects	COP28 40 subjects	Fishers Exact p-value
Clinical Success(at 24+ months)	84 / 92 (91.3%)	36 / 40 (90.0%)	0.7541
*Total Harris Hip Score >= 80	84 / 92 (91.3%)	36 / 40 (90.0%)	0.7541
*Mild - Slight - No Pain	86 / 92 (93.5%)	38 / 40 (95.0%)	1.0000
*Radiographic Success(at 24+ months)	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
*Radiolucencies <= 2mm	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
*Acetabular Migration <= 4mm	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
*Acetabular Inclination <= 4 Degrees	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
*Osteolysis None	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
Absence of Revision	91 / 92 (98.9%)	38 / 40 (95.0%)	0.2179
OVERALL COMPOSITE SUCCESS RATE	**84 / 92 (91.3%)**	**36 / 40 (90.0%)**	**0.7541**

* Subjects who were revised were also considered to be clinical and radiographic failures, The denominator of 92 COC36 subjects in the 36mm Supplement Cohort includes 1 revised subject who did not reach the 24-Month study endpoint but is shown in this table to be a clinical and radiographic failure, and the denominator of 40 COP28 subjects includes 2 revised subjects who did not reach the 24-Month study endpoint but are shown in this table to be clinical and radiographic failures.

Patients were asked preoperatively and at follow-up visits to identify their level of pain

on a visual analog scale. Specifically, a mark was placed on a line where one end denoted "NO PAIN" and the other denoted "SEVERE PAIN". The location of the mark on the line was proportionately converted to a 100 point scale with 0 denoting "NO PAIN" and 100 denoting "SEVERE PAIN". A presentation of VAS pain score means for the Safety Dataset subjects by treatment group over time is given in **Table 57**. The difference in means for 24+ Month Efficacy Dataset subjects at 24+ Months was not significant (p = 0.304) as presented in **Table 58**.

Table 57: Timecourse of Visual Analog Scale Means: 36mm COC Study, Safety Dataset

	Interval											
	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Treatment Type												
C	64.15	74	9.99	70	8.20	65	8.21	67	4.77	61	7.61	69
I	66.02	167	10.37	163	9.19	146	6.28	154	7.21	134	10.13	158

Table 58: Comparison of 24+ Month Visual Analog Scale Means: 36mm COC Study, 24+ Month Efficacy Dataset

Parameter	Treatment	N	Means	Standard Error of Difference	t-test p-value
24+Month VAS Score	C	67	6.63	2.10	0.304
	I	146	8.48		

A presentation of VAS pain score means for the 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups by treatment group over time is given in **Table 59**. The difference in means for 24+ Month Efficacy Dataset subjects in the Subset Cohort at 24+ months was not significant (p=0.727) as presented in **Table 60**.

Table 59: Timecourse of Visual Analog Scale Means: 36mm COC Study, Safety Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

	Interval											
	Pre-Op		6 Week		6 Month		12 Month		24 Month		24 Month+	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Treatment Type												
C	65.78	40	8.95	38	8.65	37	9.87	38	4.22	32	5.41	37
I	67.46	97	10.43	94	9.48	83	5.93	89	8.34	78	10.14	94

Table 60: Comparison of 24+Month VAS Score Means: 36mm COC Study, 24+ Month Efficacy Dataset Subset Cohort of Patients with S-ROM and Summit Porocoat Femoral Stems and Pinnacle 100 (Porocoat) and Sector II (Porocoat) Acetabular Cups

Parameter	Treatment	N	Means	Standard Error of Difference	t-test p-value
24+Month VAS Score	C	37	5.41	2.72	0.080
	I	92	9.25		

Conclusions Drawn from the 36mm COC Study Data

The clinical data support the reasonable assurance of safety and effectiveness of the 36mm DePuy Ceramax™ Ceramic Total Hip System when used in accordance with the indications for use and indicated population. It is reasonable to conclude that the benefits of the use of the 36mm DePuy Ceramax™ Ceramic Total Hip System for the target population outweighs the risk of surgery when used in accordance with the direction of use.

Sterility and Handling

- The implants described in this package insert are provided sterile as indicated on the individual product's label.
- **DO NOT RESTERILIZE**
- Implants are for single use only. Components may not be resterilized by the hospital because of the possibility of damaging the articulating and interfacing surfaces of the implant
- The implants should be opened using aseptic OR techniques. The package should be opened only after the correct size has been determined, as opened packages may not be returned for credit.
- Implants in sterile packaging should be inspected to ensure that the packaging has not been damaged or previously opened. **DO NOT USE if the package is damaged or broken as sterility may be compromised.**

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* For recognized manufacturer and model designation, refer to product label.
* Le nom du fabricant agréé et la désignation du modèle sont indiqués sur l'étiquette du produit.
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* Raadpleeg het etiket op het product voor de erkende fabrikant en modelbenaming.
* Se produktetiketten for anerkendt producent og modelbetegnelse.
* Tillverkarens namn och modellbeteckning anges på märkskylten.
* Hyväksytyn valmistajan nimi ja mallimerkinnät löytyvät pakkaustarrasta.
* Για τον αναγνωρισμένο κατασκευαστή και την ονομασία του μοντέλου, ανατρέξτε στην ετικέτα του προϊόντος.
* Informace o uznávaném výrobci a určení modelu naleznete na štítku výrobku.
* A hivatalos gyártót és a modell megnevezését illetően lásd a termék címkéjét!
* Dane producenta i przeznaczenie modelu zawarte są na etykiecie produktu.
* Uznávaného výrobcu a označenie modelu nájdete na štítku produktu.

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