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R3volution in motion

Launched over ten years ago and with over one million acetabular cup implants sold, the R3° Acetabular System provides surgeons the perfect combination of clinical heritage with modern day design. The R3 Acetabular System combined with the Smith & Nephew portfolio of hip stems provides an advanced hip replacement system with:

- Wide range of advanced bearing options
- Designed to achieve excellent primary stability
- Flexible instrumentation

General features

- No-hole, three-hole, and multi-hole hemispherical shell offering
- Polished inner surface to minimize backside wear
- STIKTITE° Porous Coating for enhanced scratch-fit feel and initial fixation
R3° Liner options

XLPE
Offered in 0° and 20°, 0° and 20°+4mm lateralized, and constrained options

Ceramic-on-ceramic
offered in BIOLOX® Delta

Biolox Delta not available in the U.S
Advanced bearing surfaces: VERILAST™ Technology
Oxidized Zirconium with XLPE

R3° system with VERILAST Technology is an advanced bearing option

VERILAST™ Technology for hips from Smith & Nephew uses the exclusive bearing combination of proprietary OXINIUM® and highly cross-linked polyethylene, which provides proven clinical survivorship and biocompatibility without sacrificing versatility or introducing the risk of ceramic-like fracture.1,2,3

Most importantly, VERILAST Technology provides low wear, corrosion avoidance and real-life results.1,2,3

Wear performance

VERILAST Technology for total hip arthroplasty has been in-vitro tested and shown to provide superior wear performance compared to CoCr on highly crosslinked polyethylene, for up to 45 million cycles.2 With advanced materials designed to last, VERILAST Technology is designed to help restore patients to their active lifestyles, allowing joint pain to be addressed earlier.

Cumulative volumetric wear comparison2

Real life results

Oxidized Zirconium has a clinical history of more than 10 years. Over 500,000 components have been implanted successfully to date. Impressive clinical performance of OXINIUM heads has been reported in global registry data. In the 2016 Australian Registry, the ceramicized metal/cross-linked polyethylene category, which includes the exclusive OXINIUM alloy from Smith & Nephew, had the highest survivorship of all bearing categories at ten years: 96.8%.1* See the 2016 Australian Registry Results inserts to read more.

*Although the Ceramicised Metal/ XLPE combination has the lowest reported cumulative percent revision at 10 years, this result should be interpreted with caution. This bearing is a single company product used with a small number of femoral stem and acetabular component combinations. This may have a confounding on the outcome, making it unclear if the lower rate of revision is an effect of the bearing surface or reflects the limited combination of femoral and acetabular prostheses.
Biocompatibility
Protect against taper corrosion

There is a growing concern in the orthopaedic community about fretting and corrosion at the head neck taper junction. With its biocompatible properties, due to its use of Oxidized Zirconium, VERILAST Technology has shown to reduce taper corrosion in total hip arthroplasty, which could minimize the concern of trunnionosis.

A study by Pawar et al. used an acidic fretting test to compare the potential corrosive and fretting responses of OXINIUM® (OxZr) and cobalt chrome (CoCr) femoral heads.

Not your average cross-linked poly

The Smith & Nephew 10 Mrad, fully annealed XLPE is proven to produce less volume of wear debris particles in all size ranges. Less wear debris provides a reduced chance for osteolysis.

All currently marketed crosslinked poly indicates a significant improvement in the volume of wear debris, which would lead one to assume all crosslinked poly is the same. However, Smith & Nephew investigated more closely and found that not all crosslinked poly minimizes the amount of particles generated.

Because the wear particles of crosslinked poly can be smaller in size than with UHMWPE, it is possible to reduce the volume but actually increase the number of particles.

The Smith & Nephew crosslinked polyethylene significantly reduces the number of particles generated. The gravimetric wear rate of R3 XLPE is not measurable in a hip simulator, but the number of particles generated is reduced by 80% compared to traditional CoCr on conventional poly bearing.
R3° ceramic-on-ceramic bearing couple

Ceramic-on-ceramic bearing surfaces have been used worldwide in total hip replacement for more than 30 years. Renewed interest in ceramics as an alternate bearing surface has been driven by the following:

- New technology
- Improved manufacturing processes and standards
- New designs

This translates into improvements in the following:

- Mechanical and physical properties
- Wear characteristics
- Optimized biocompatibility
- Reliability expected by today’s more active patients

**Neck impingement**

The flush-seating liners of the R3 ceramic acetabular system in combination with Smith & Nephew femoral stem neck geometry:

- Designed to increase the range of motion and consequently, may reduce the likelihood of impingement.⁹
- Mitigates the risks of metal transfer and increased friction imposed by designs with a raised rim.¹⁰

The R3 system’s ceramic design is an assembled combination of:

- A ceramic component made from orthopaedic industry standard material, BIOLOX® Delta
- A precision-machined support ring made of a Titanium alloy (Ti-6Al-4V) that is commonly used in orthopaedic implants.

**Titanium support ring for added strength**

The unique feature about R3 ceramic liners is that they come with a titanium support ring around the periphery of the liner. The support ring and ceramic liner are precisely assembled utilizing a cold pressing process. This process is used so that the material properties of the ceramic and titanium are not altered.

The supporting ring is designed to protect against chipping the ceramic liner.
Stability: head/shell ratios

Optimized head/shell ratios

Use of larger diameter femoral heads has been clinically reported to decrease the probability of dislocation in patients.\textsuperscript{11-14}

- Large heads provide better potential ROM of the joint.\textsuperscript{11-13}
- Large heads may reduce the incidence of neck impingement with soft tissue or the edge of the shell.\textsuperscript{14}
With the R3° Acetabular System, surgeons have the option of using larger head sizes in smaller acetabular shells:

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Femoral heads
- CoCr and OXINIUM®
- Ceramic
R3° locking mechanism for secure liner stability

**R3 locking mechanism design features:**
- Locking taper that supports ceramic liners
- Double-channel lock design is intended to provide axial stability for poly liners
- 12 large anti-rotational tabs on the poly liner intended to provide rotational stability

Intraoperative adjustments to the liner position may be performed with true confidence. Independent researchers confirm that in some competitive locking designs, the liner can be significantly damaged by extraction, which prohibits liner repositioning. Laboratory tests of the R3 locking mechanism have shown it withstands consecutive insertions of the same liner without damaging its locking integrity.
Push-out and torque-to-failure tests of the R3™ locking mechanism demonstrate that it offers the benefit of a secure and stable liner. The R3 lock can withstand over 1112N of push-out force in any of its liner options and over 40 N·m of torque.
Enhanced stability and fixation with STIKTITE Porous Coating

Utilizing STIKTITE coating on the R3° Acetabular Shells allows for a true scratch-fit feel during the shell seating and a clinically proven in-growth surface for long-term implant success.19
STIKTITE Porous Coating demonstrated a higher coefficient of friction compared to porous tantalum when tested by the same method. The mean coefficient of friction for STIKTITE coating was higher than that of porous tantalum against both cancellous and cortical bone. These results indicate that STIKTITE coating should have superior friction, scratch-fit feel and initial fixation stability as compared to porous tantalum.

Frictional coefficients of bone ingrowth structures against cancellous and cortical bone.

STIKTITE’s increased roughness and 61% porosity provide greater coefficient of friction against cancellous bone than competitive porous coatings. Improved initial stability is a prerequisite to boney ingrowth and long term stability. The average pore size of STIKTITE coating (200 µm) is within the 100– to 500–µm range for optimal bone ingrowth.

*The results of in-vitro simulation testing have not been proven to predict clinical performance.
Streamlined instrumentation improves surgical efficiency

This seemingly simple technique is a very effective way of precisely placing the ceramic liner inside the shell without the issue of improper seating due to misalignment as seen in other competitive systems.\textsuperscript{24-25} Cocking of a ceramic liner, in particular, during impaction can lead to a fracture of the liner.
References

5. Carter et al ORS 2014
22. Gilmour et al. 8th WBC, 2611, 2008.