AVANTEON

System Design Rationale

AVANTEON
HIP SYSTEM

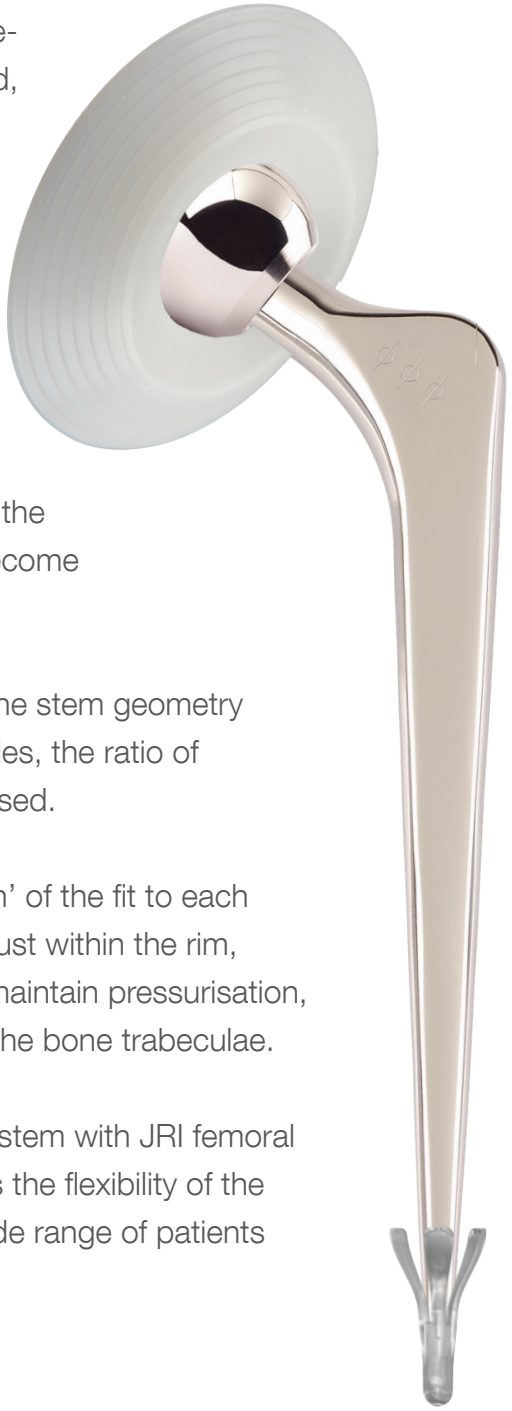
Jri Orthopaedics
Innovation in Practice

Contents

Introduction	2
AVANTEON Design Faculty	3
AVANTEON Head & Cup Combinations	4
AVANTEON Femoral Stems - Design Features	5
UK Hybrid Hip Usage	7
UK Fracture Neck of Femur Treatment	8
AVANTEON Hemiarthroplasty	9

Introduction

Cemented, collarless, highly polished, double-tapered femoral stem prostheses and flanged, ultra high molecular weight polyethylene (UHMWPE) cups, used in combination with contemporary cementing techniques, have produced successful clinical results in hip replacement over many years.



The taper-slip design philosophy is that a collarless, highly polished, double-tapered femoral prosthesis will subside slightly within the cement mantle, progressively engaging to become more stable and secure over time.

Bone cement is strong in compression and the stem geometry loads the cement mantle so that, as it subsides, the ratio of compression to shear forces is greatly increased.

Using a flanged cup allows for ‘customisation’ of the fit to each acetabulum, so that the trimmed flange sits just within the rim, containing the bone cement and helping to maintain pressurisation, to acheive interdigitation of the cement with the bone trabeculae.

The possibility of combining the AVANTEON stem with JRI femoral heads and acetabular components increases the flexibility of the system, making it an ideal treatment for a wide range of patients requiring hip replacement.

AVANTEON Design Faculty

"The AVANTEON femoral stem was designed to incorporate the best features of all taper slip cemented stems in one system."

Professor Ian Stockley MB, ChB, MD, F.R.C.S

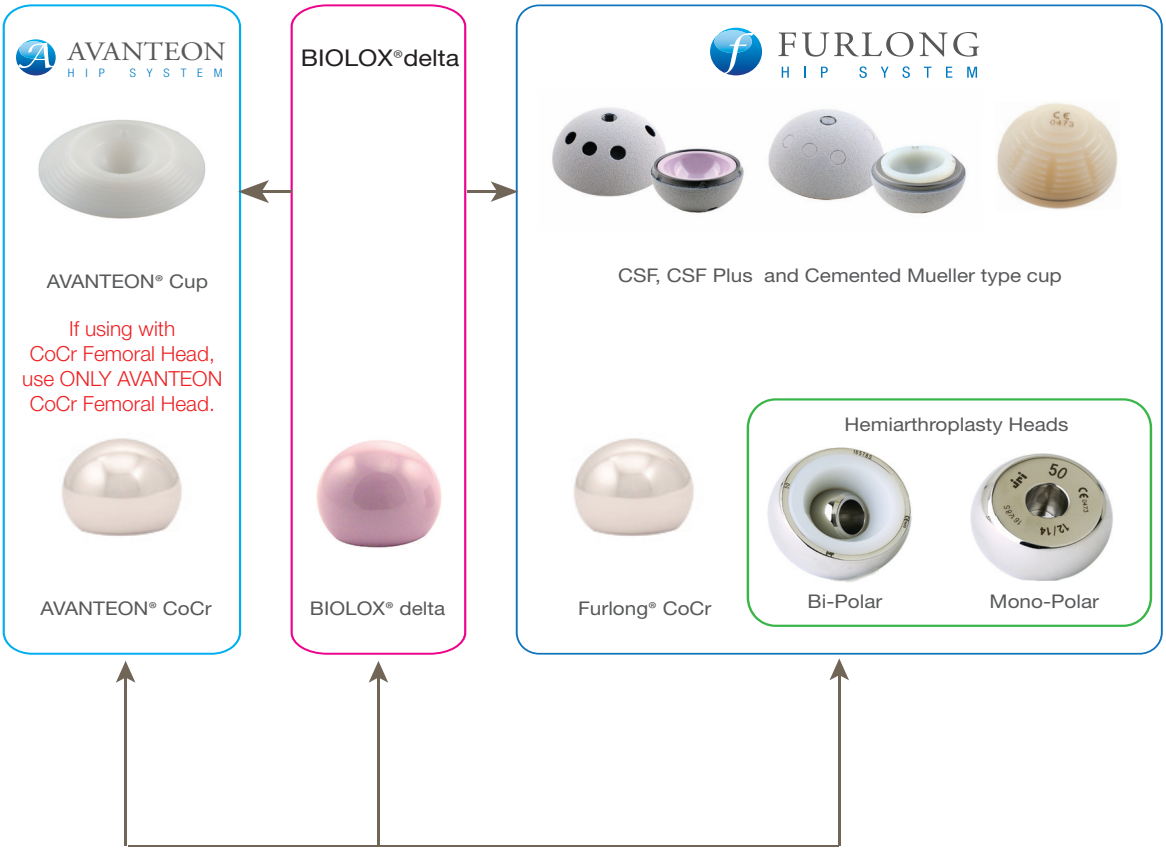
Mr Andrew Hamer
MB, ChB, MD, F.R.C.S. (Orth)

Mr Simon Buckley
MB, BS, F.R.C.S. (TR & Orth)

Mr Robert Kerry
MB, BS, F.R.C.S. (Orth)

The AVANTEON cemented total hip replacement has been designed by four consultant orthopaedic surgeons from the Arthroplasty Unit at Northern General Hospital, Sheffield, UK. Based on their collective experience of over 40 years using hip replacement implants which adhere to the taper slip philosophy and using contemporary cementing techniques in the femur and acetabulum, the AVANTEON implants and intrumentation have been designed to facilitate this approach and produce optimum outcomes for patients.

AVANTEON Head & Cup Combinations



Stem

AVANTEON HIP SYSTEM

AVANTEON Femoral Stems - Design features

The AVANTEON femoral stem design is based on the proven taper-slip philosophy.

4 Offset options (36, 38, 45, and 50mm) - enable restoration of hip joint biomechanics

12/14 Euro taper - Morse locking tapers ensure secure fixation of the head, reducing the potential for fretting and corrosion

Slim profile neck - to increase range of motion without impingement

6 stem sizes - to best match the implant to the patient

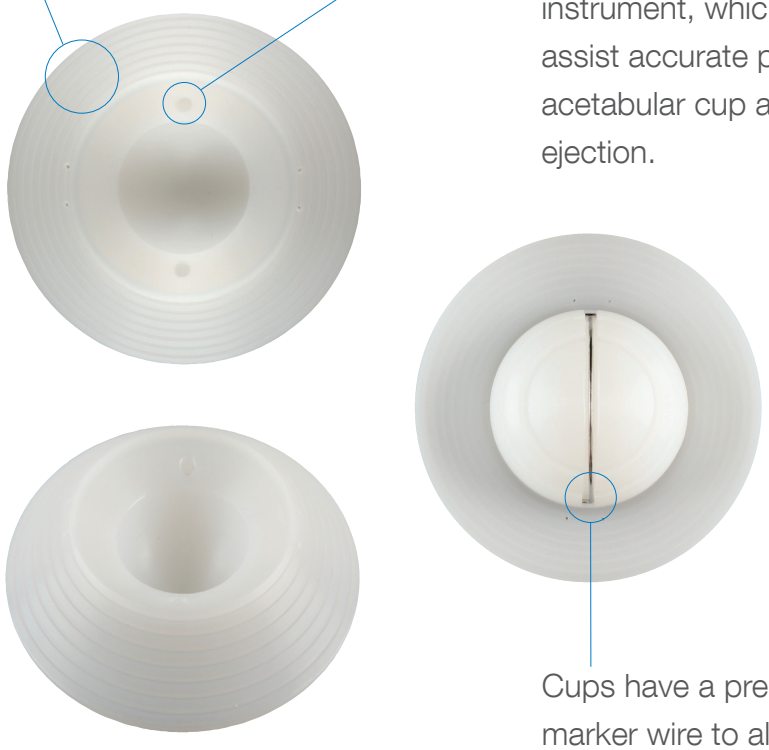
High nitrogen stainless steel - Proven optimum material for double tapered stem adhering to the 'taper slip' philosophy

125º CCD angle - Optimum for maximum hip joint stability in the majority of patients

Distal centraliser with tantalum marker - An integral tantalum bead provides a datum to monitor subsidence of the stem within the cement mantle on post-operative radiographs

The flange is sufficiently flexible to allow for good conformity with the bone just within the rim of the acetabulum, while having the required stiffness to contain and exert pressure on the bone cement.

The holes in the outer rim of the face of the cup allow for secure attachment of the cup inserter instrument, which is designed to assist accurate positioning of the acetabular cup and smooth ejection.



Cups have a pre assembled X-ray marker wire to allow identification of cup position on the post-operative X-ray.

AVANTEON cups are available in socket body outside diameter sizes of 40mm, 42mm, 44mm, then increasing in 4mm increments to 60mm. All sizes are available in standard and long posterior wall versions.

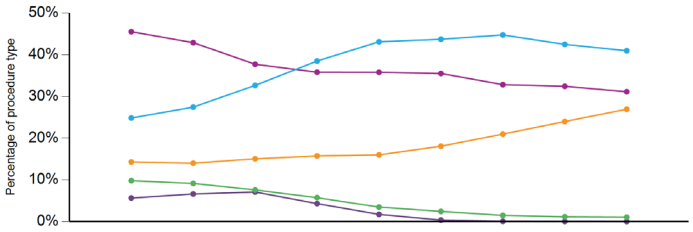
The AVANTEON cemented acetabular cup design is based on the proven principle of using a trimmable flange to contain cement in the acetabulum and achieve cement pressurisation.

Hybrid Hips

According to the 12th edition of the England, Wales, and Northern Ireland National Joint Registry, the hybrid hip is the only primary hip construct that is growing in terms of the number of procedures, accounting for 27% of primary hip replacement procedures in 2014.

Type of primary hip replacement procedures.

Country: England, Wales, Northern Ireland



Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cemented	46%	43%	38%	36%	36%	35%	33%	32%	31%
Cementless	25%	27%	33%	38%	43%	44%	45%	42%	41%
Hybrid	14%	14%	15%	16%	16%	18%	21%	24%	27%
Resurfacing	10%	9%	8%	6%	3%	2%	1%	1%	1%
Large head metal-on-metal (> 36mm)	6%	7%	7%	4%	2%	<1%	<1%	<1%	<1%
Number of procedures	59,999	67,361	70,668	71,135	73,332	76,170	80,424	84,194	88,763

CLP75® highly cross-linked polyethylene

CSF Plus - High performance bearings

Combining the AVANTEON stem with the clinically proven CSF Plus Cup (currently 10A* ODEP rated) enables surgeons to select from metal on poly, ceramic on poly, or ceramic on ceramic bearing options to provide the most appropriate hybrid hip construct to meet their patients' needs.

The Furlong® H-A.C. CSF Plus polyethylene bearing cups accept CLP75® (JRI's proprietary highly cross-linked polyethylene) liners. To maximise polyethylene thickness, each liner fits one shell size only. The 5° internal taper of the shell provides a secure non-destructive locking mechanism ensuring that the coupling is free of micro-movement, greatly reducing the risk of backside wear*. Should additional stability be required, 10° hooded liners are available for use with all shell sizes. Where adjunctive screw fixation is not used, screw-hole plugs are provided to seal the cup against polyethylene debris migration.

*Data presented at Efort 2003 (Helsinki) -The 6 to 10 year results of the CSF hydroxyapatite coated acetabular cup : Andrew F.M. McKee, M.D.George, R. Hussein, J.A.N. Shepperd : Conquest Hospital, Hastings, England.

AVANTEON treatment for fractured neck of femur

The treatment of the displaced intra-capsular fractured neck of femur places huge demands on trauma units. Following the publication of the NICE CG124 and QS16 reports, recommendations within the reports have led to changes in the treatment pathway and changes in the implants used. To comply with the recommendations, a modern system for treating femoral neck fractures must have the ability to be used as a total hip replacement as well as a hemiarthroplasty.

AVANTEON femoral stems are compatible with the full range of femoral heads from JRI, providing the flexibility of total hip and hemiarthroplasty options for treating patients with intracapsular femoral neck fractures, according to the NICE guidelines.

NICE CG124 and QS16

In 2011, NICE performed a rigorous search, critical appraisal and economic analysis of the published literature on key areas of the care of hip fracture patients. This led to their publication of clinical guideline 124 (CG124), 'THE MANAGEMENT OF HIP FRACTURE IN ADULTS'[1]
In 2012, NICE published a quality standard for hip fracture (NICE QS16)[2]

Recommendations

People with displaced intra capsular fracture should receive a cemented arthroplasty, with the offer of total hip replacement if clinically eligible*.

*Eligible is defined as patients with displaced intra capsular fracture, who were ASA 1–2, with a normal mental test score, and were able to walk outside using no more than a stick.

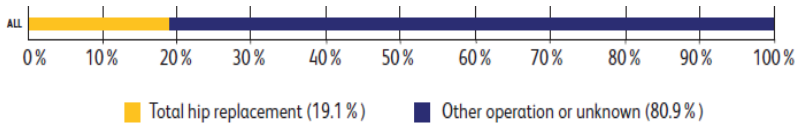
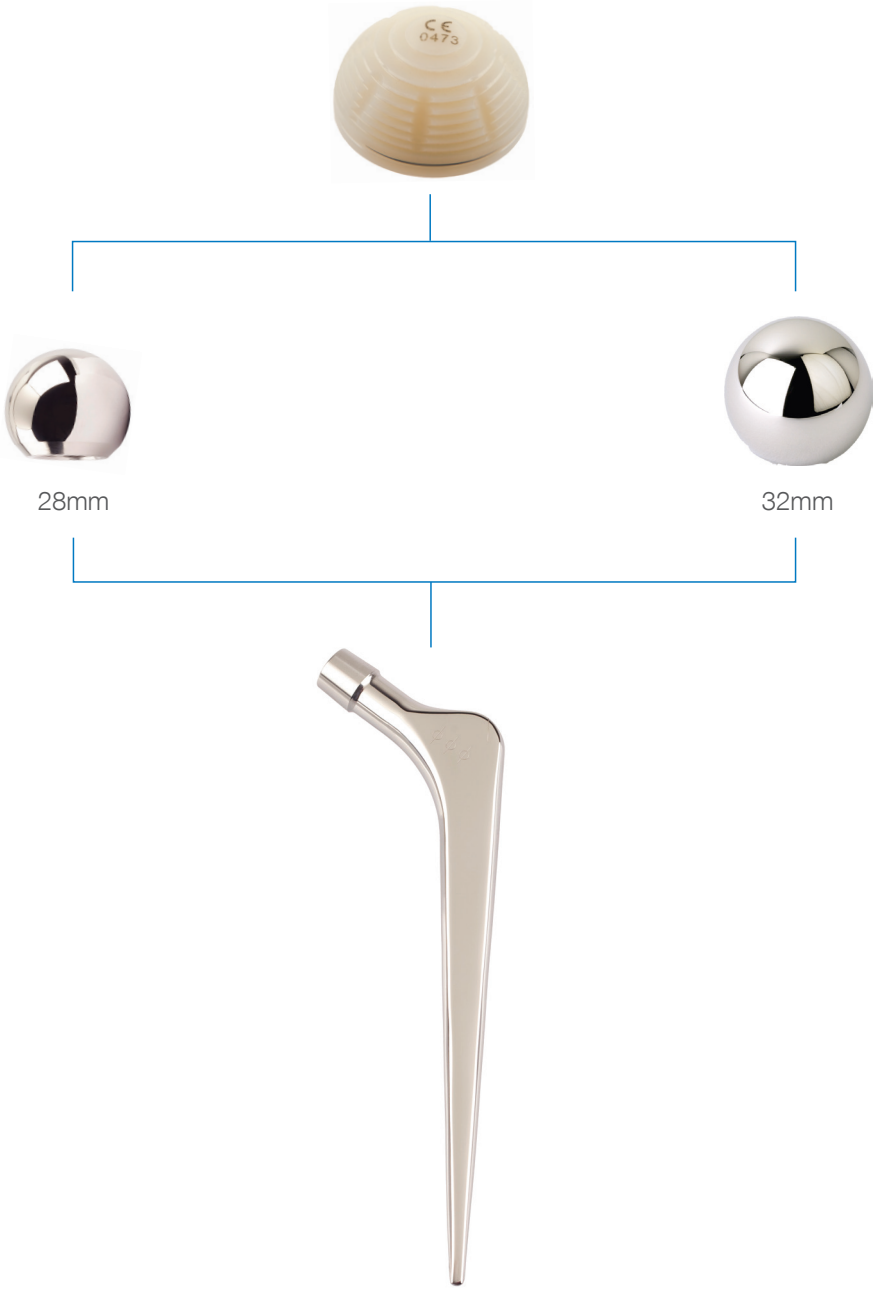


Chart showing the percentage of eligible cases that received total hip replacement in 2014.[3]

1 National Institute for Health and Care Excellence (NICE), 2011. The management of hip fracture in adults – clinical guideline CG124. www.nice.org.uk/guidance/CG124
2 National Institute for Health and Care Excellence (NICE), 2012. Quality standard for hip fracture (QS16). www.nice.org.uk/guidance/QS16
3 Falls and Fragility Fracture Audit Programme (FFFAP), National Hip Fracture Database (NHFD)extended report 2014 http://www.nhfd.co.uk/

The AVANTEON femoral stem combined with the JRI Mueller Cup provides a cost effective solution for patients with displaced intracapsular femoral neck fracture who are clinically eligible for total hip replacement.



JRI's cemented Mueller type cup currently has a 10A* ODEP rating and has been in clinical use since 1979. Available in 28mm and 32mm inner diameter (I/D) options in standard UHMWPE. 36mm I/D cups are available in CLP 75® JRI's highly cross-linked UHMWPE.

Self centralising, eccentric offset bi-polar heads reduce the risk of the outer head assuming a varus position, thus maintaining neutral alignment. This allows the low friction 22.22mm inner head to articulate against the UHMWPE internal liner, therefore reducing wear and decreasing the risk of dislocation.

The JRI bi-polar heads are pre-assembled in the factory and are available in 1mm increments from 40 - 54mm for the outside diameter (O.D.) and in 56 and 58mm for the outside diameter.

The 12/14 taper on the AVANTEON stem allows for subsequent conversion from hemiarthroplasty to total hip, should this be required, simply by removal of the bi-polar or physiological head and replacement with a JRI CoCr femoral head and cementing of a JRI Mueller Cup in the acetabulum.

JRI physiological heads are available in 1mm increments from 39mm - 58mm O.D.

JRI Services/Education

- Nurse Training
- Factory Visits
- Basic, instructional and advanced hip courses
- On demand loan sets
- In service technical support
- Consignment stock audits
- Instrumentation checks and maintenance
- Digital PACS and hard-copy X-Ray templates

Go to www.jri-ltd.com or simply scan the QR code with your smartphone

Manufactured & Distributed by

jri Orthopaedics

Innovation in Practice

18 Churchill Way, 35A Business Park, Chapeltown, Sheffield S35 2PY

T: 0114 345 0000 F: 0114 345 0004 W: www.jri-ltd.com

CE 0086