smith&nephew
BIRMINGHAM HIP®
Resurfacing System

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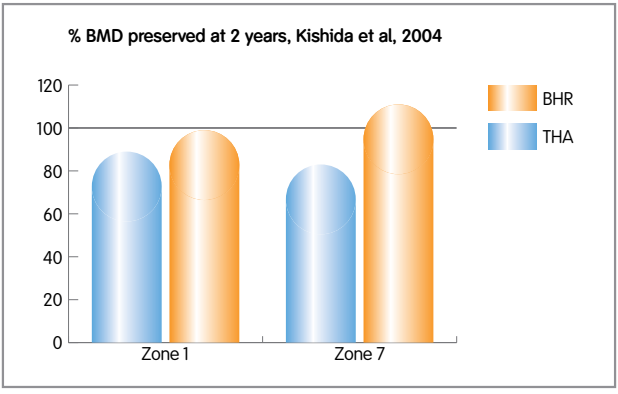
Thank you for your interest in the Smith & Nephew BIRMINGHAM HIP® Resurfacing system. With over 125,000 implantations globally and more than 12 years of follow-up, the results of the BHR system have separated it from other resurfacing devices.

Why resurfacing?

The concept of hip resurfacing provides potential benefits for the surgeon and patient. Bone preservation is a central concern for younger patients who want to return to an active lifestyle. By preserving existing bone rather than removing and replacing a large section of the femur, natural anatomical biomechanics can be maintained. This may also make for an easier revision to a conventional stemmed total hip replacement if required.

Not only is bone conserved, but BMD (bone mineral density) may also improve with the BHR® system. The design of the BHR transfers load in a more physiological manner than conventional THA. Studies have shown significant increases in bone mineral density in the proximal femur with BHR compared to stemmed total hips[1,2].



Further studies have also shown improved function, kinematics and faster recovery for patients who have had total resurfacing versus those who have had total hip arthroplasty.[3,4,5] Haddad et al compared the outcome of 40 BHR patients and 40 THA patients and showed an immediate improvement in balance, power and coordination with the BHR system compared to THA. The BHR group rated their function had improved at six weeks compared with no improvement in the THA group.

There's only one BHR®

Unbiased data from the 2009 Australian registry has proven over time that the BHR system has superior performance compared to other resurfacing designs.

Australian Orthopaedic Association National Joint Replacement Registry Annual Report. Adelaide: AOA; 2009. Table HT46.

Femoral and Acetabular Component	Implanted	Cumulative Percent Revised YR 1	YR 3	YR 5	YR 7	YR 8
ASR™	1073	3.6	6	8.7		
BHR® *	8427	1.5	2.5	3.6	4.8	5.0
Conserve™ Plus	62	3.2	5.1	9.7	9.7	
Cormet™	192	1.6	3.8	5.3	16.0	
Cormet™ HAP BiCoat	287	2.8	5.0			
Durom™	767	3.0	4.7	6.7		
Recap™	137	5.0	7.6			

Also, resurfacing has a lower revision rate at 7 years in the subgroup of male patients from 55- 64 years

Table HT20 and Table HT40: Yearly Cumulative Percent Revision of Primary Total Resurfacing Hip Replacement and Primary Conventional Hip Replacement by Gender and Age (Primary Diagnosis OA excluding Infection)

	Cumulative Percent Revised YR 1	YR 3	YR 5	YR 7
All hip resurfacings				
Males 55-64	1.6	2.2	2.7	3.6
All total hip replacements				
Males 55-64	1.2	2.1	2.9	4.2

In addition to registry data, there are many independent studies that show globally consistent results of the BHR device.

Author	Site	n	Survival	Follow-up
Shimmin *et al* [6]	Melbourne	230	99.14%	5 years
McMinn *et al* [7]	Birmingham	1,626	98.40%	5 years
Oswestry Registry [8]	45 surgeons	683	95.70%	8 years
Treacy *et al* [9]	Birmingham	144	98.00%	5 years

Metallurgy matters

The metallurgy of the BIRMINGHAM HIP® Resurfacing System is based upon that the forensic study of successful long term metal-on-metal devices. The BIRMINGHAM HIP Resurfacing System is produced from high carbon cobalt chrome and is left in the As Cast state (never heat treated). Carbides are formed in the casting process, and as these carbides are harder than the metal substrate they provide wear resistance, especially at start up.

The BHR® system is designed to a precise geometry based on clinically successful first generation metal-on-metal total hips, which provides fluid lubrication in the bearing reducing long-term wear.

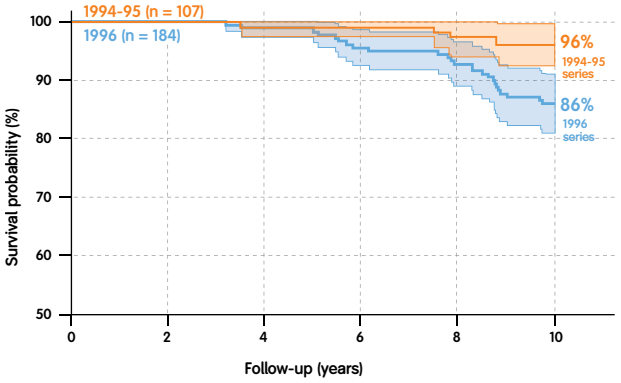
Carbides cup

70µm - E134.001 cup

Carbides head

70µm - E134.001 head

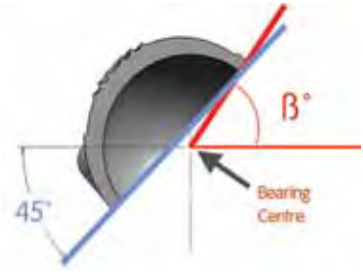
Heat treatments detrimentally effect the wear resistance of metal-on-metal bearings. Clinical data examining a single surgeon series of resurfacing cases has shown a decrease in long-term survivorship with a double heat-treated implant versus a single heat-treated implant with identical implant geometry.



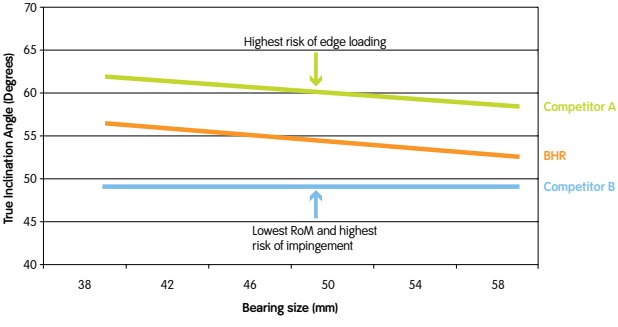
Component Design

Acetabular component design is an important consideration when comparing hip resurfacing devices. The BIRMINGHAM HIP® Resurfacing System acetabular component has been designed to optimize range of motion and articular coverage to reduce the risk of accelerated wear secondary to impingement/subluxation or edge-loading. For all advanced bearings (metal-on-metal, ceramic-on-ceramic and cross link polyethylene) edge-loading should be avoided, as it may result in accelerated wear.

The BIRMINGHAM HIP acetabular component design is optimized for both range of motion and articular coverage compared with other hip resurfacing cups.

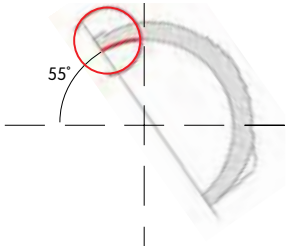


The beta (ß) angle illustrates the 'true inclination angle' of an actabular component from the bearing centre. The higher the beta angle, the higher the risk for edge loading.

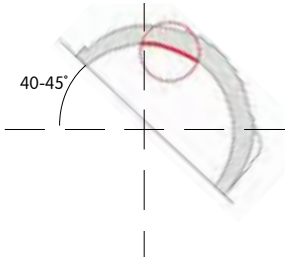


What about Pseudotumors?
There is a great deal of buzz surrounding adverse local tissue response with metal-on-metal bearings and resurfacing. The tissue responses are not limited to metal-on-metal, but have been associated with all bearings types.[10,11,12,13] Higher wear and edge-loading are contributing factors in the reports of adverse local tissue responses in metal-on-metal bearings.[14]

Edge-loading can have negative effects, including wear, for all bearings. This loading can lead to rim fractures with cross link polyethylene, squeaking with ceramic and accelerated wear with metal bearings.[15,16] To improve long term success of the implant, edge-loading should be avoided. Recent clinical studies confirm that acetabular components placed in excessive anteversion (>25°) and inclination (> 50°) can lead to a 2-10+ fold higher metal ion release in metal-on-metal bearings.[17,18,19] Acetabular component position of 40-45° inclination and 15-20° anteversion is recommended within the BHR® surgical technique for longevity of the bearing.



Schematic diagram of acetabular component with edge loading.



In a well functioning device the wear is completely contained within the bearing surface.

References

1. Kishida Y, Sugano N, Nishil T, Miki H, Yamaguchi K, Yoshkawa H. Preservation of bone mineral density of the femur after surface replacement of the hip. The Journal of Bone and Joint Surgery (Br) (March 2004), 86-8, 185-89
2. Hayaishi Y, Miki H, Nishi T, Hananouchi T, Yoshikawa H, Sugano N. Proximal femoral bone mineral density after resurfacing total hip arthroplasty and after standard stem type cementless total hip arthroplasty both having similar neck preservation and the same articulation type. J Arthorplasty 2007 Dec. 22 (8):1208-121
3. Haddad FS, Bull J, Soler JA. Hip resurfacing has superior sustained functional outcomes when compared to Total Hip Arthroplasty. Presented at AAOS. March 6-8, 2008; San Francisco, CA
4. Lavigne M, Masse V, Girard J, Roy AG, Vendittoli PA. Return to sport after hip resurfacing or total hip arthroplasty: a randomized study. Rev Chir Orthop Reparatrice Appar Mot. 2008 Jun;94(4):361-7. Epub 2008 Apr 2.
5. Zywiel MG, Marker DR, McGrath MS, Delanois RE, Mont MA. Resurfacing matched to standard total hip arthroplasty by preoperative activity levels - a comparison of postoperative outcomes. Bull NYU Hosp Jt Dis. 2009;67(2):116-9.
6. Back DL Dalziel R Young D Shimmin A. Early results of primary Birmingham hip resurfacings. An independent prospective study of the first 230 hips. J Bone Joint Surg Br 2007 87(3):324-9.
7. FDA Review Memo, Page 59 2005.
8. Khan M, Kuiper JH, Edwards D, Robinson E, Richardson JB. Birmingham hip arthroplasty: five to eight years of prospective multicenter results. J Arthroplasty. 2008 24 (7); 1044-50
9. Treacy RB McBryde CW Pynsent PB Birmingham hip resurfacing arthroplasty. A minimum follow-up of five years. J Bone Joint Surg Br (2005 Feb) 87(2):167-70
10. Jones K, Patel P, DeYoung B, Buckwalter J. Viscosupplementation Pseudotumor. A Case Report. J Bone Joint Surg Am. 2005;87:1113-1119. doi:10.2106/JBJS.D.02436
11. Svensson O, Mathiesen EB, Reinholt FP, Blomgren G. Formation of a fulminant oft-tissue pseudotumor after uncemented hip arthroplasty. A case report. J Bone Joint Surg Am. 1988;70:1238-1242.
12. Hisatome T, Yasunaga Y, Ikuta Y, Takahashi K. Hidden Intrapelvic Granulomatous Lesions Associated with Total Hip Arthroplasty. A Report of Two Cases. J Bone Joint Surg Am. 2003;85:708-710.
13. Park KS, Diwanji S, Kim HK, Song EK, Yoon TR. Hemorrhagic Iliopsoas Bursitis Complicating Well-Functioning Ceramic-on-Ceramic Total Hip Arthroplasty. The Journal of Arthroplasty. Vol. 24 No 5 2009.
14. Increased wear of metal-on-metal hip resurfacing implants revised due to pseudotumours, Kwon YM, Glyn-Jones S, Simpson DJ, Kamali A, Counsell L, McLardy Smith P, Beard DJ, Gill H.S, Murray DW, AAOS presentation, 2010
15. Walter WL, MBBS, O'Toole GC, Walter WK, Ellis A, Zicat BA. Squeaking in Ceramicon-Ceramic Hips: The Importance of Acetabular Component Orientation, The Journal of Arthroplasty. 2007; Vol. 22 No. 4.
16. Tower SS, Currier JH, Currier BH, Lyford KA, Van Citters DW, MB Mayor. Rim Cracking of the Cross-Linked LongevityPolyethylene AcetabularLiner After Total Hip Arthroplasty. J Bone Joint Surg Am. 2007;89:2212-2217.
17. Langton DJ, Jameson SS, Joyce TJ, Webb J, Nargol AVF. Blood metal ion concentrations post hip resurfacing arthroplasty: a comparison study of the articular surface replacement and Birmingham hip resurfacing devices. J BoneJoint Surg Br. 2009;91-B(10)
18. Langton DJ, Jameson SS, Joyce TJ, Webb J, Nargol AVF. The effect of component size and orientation on the concentrations of metal ions after resurfacing arthroplasty of the hip. J Bone Joint Surg Br. 2008;90-B(9):1143-1151
19. De Haan R, Campbell PA, Su EP, De Smet KA. Revision of metal-on-metal resurfacing arthroplasty of the hip: The influence of malpositioning of the components. J Bone Joint Surg Br. 2008;90-B(9):1158-1163.

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