

*WEAR OF METAL-ON-METAL 'OFF-THE-SHELF' HA-COATED/ BEADED HIP BEARINGS

J. Bowsher¹, P. Nelson¹, P. I. Clarke¹, T. McTighe², I. Woodgate³, A. Turnbull⁴, L. Keppler⁵ and T. Donaldson⁶

Abstract

Hip simulator studies on MOM bearings have historically involved 'custom' acetabular cups. I.e. having neither beaded layers nor biological coatings.

The aim of this study was to investigate wear using such MOM bearings and evaluate the potential wear and evaluate the potential for error in the gravimetric assessment.

Six x 38 mm HC Co-Cr bearings were supplied (Global and IO International Orthopaedics). The cups were received in 'off-the-shelf' condition with a cast Co-Cr beaded/HA-coated backing. To remove the HA-coating, the cups were pre-soaked in lemon juice for 4 days (articular surfaces shielded). Custom plastic fixtures were machined to fit the beaded contours of the cups. Test duration was 5Mc inorbital hip simulator (Shore-Western). MOM wear was estimated from serum ion contamination. Serum samples were digested and assessed using ICP/MS (Weck Labs Inc, CA).

The majority of the HA-coating was removed from the cups after four days of soaking in lemon juice after 21 days of soaking all cup weights appeared atable (within 1 mg). Reflected-light microscopy (RLM) showed no discernible signs of HA and the total weight loss due to HA removal averaged – 400mg.

During hip simulator there was no visual evidence of lost or broken beads, 3rd body abrasion etc ($Sa < 30nm$). Both gravimetric and metal ion analysis showed consistent wear trends for all MOM cups. The MOM with the highest wear (predicted by ion analysis) demonstrated 1.2 mm (3)/Mc OWR at 5Mc. In comparison, gravimetric analysis predicted an OWR of 1.3 mm (3)Mc for the same MOM, a difference of only 8%. Soaking beaded-HA cups in lemon juice and BCS proved effective in removing the coating.

The beaded cups remained stable in weight during the wear study and caused little discrepancy in gravimetric analysis (8%).

The method described did not lead to breaking of beads, elevated 3rd-body abrasion, cup damage or distorted wear scars.

This Article

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Author Affiliations

¹Peterson Research Center, Loma Linda University, USA

²Joint Implant Surgery & Research Foundation, Chagrin Falls, USA

³St. Vincent's Hospital, Darlinghurst, Sydney

⁴St. George Hospital, Miranda

⁵St. Vincent Charity Hospital, Cleveland, USA

⁶Donaldson Arthritis Research Foundation, Colton, USA

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