



A Novel Approach to Reduction of Wear In THA



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Introduction:

Polyethylene and metal have been the material of choice since the 1960's. Some consider Polyethylene to be the weakest link in THA prosthetic design.^{1,2}

We are now seeing the next generation of cross-linked polyethylene along with work on alternative hard on hard bearings trying to reduce the generation of wear debris.



Poly Failure Leads to Revision Surgery



Issues have been raised from squeaking to high trace elements, strength characteristics and torsional stability of current materials.^{3,4,5,6,7,8,9}



Two failed CrossLink (Longevity™)¹⁴

MOM Bone Necrosis - A. Toms

Cup spin out 7 weeks post-op. Revision made easier by proximal modular neck design.

Thomas 2003

Hypersensitivity to metals

Ideally, the surfaces for articulating bearing surfaces will be made from materials having high strength, high wear, and corrosion resistance, a high resistance to creep, and low frictional moments.

This poster will review characteristics of a novel new approach for a bearing material.

Methods:

A review of past and current materials along with mechanical testing in creating a new approach to the development of a hydrophilic material replacing the polyethylene side of the bearing surface.

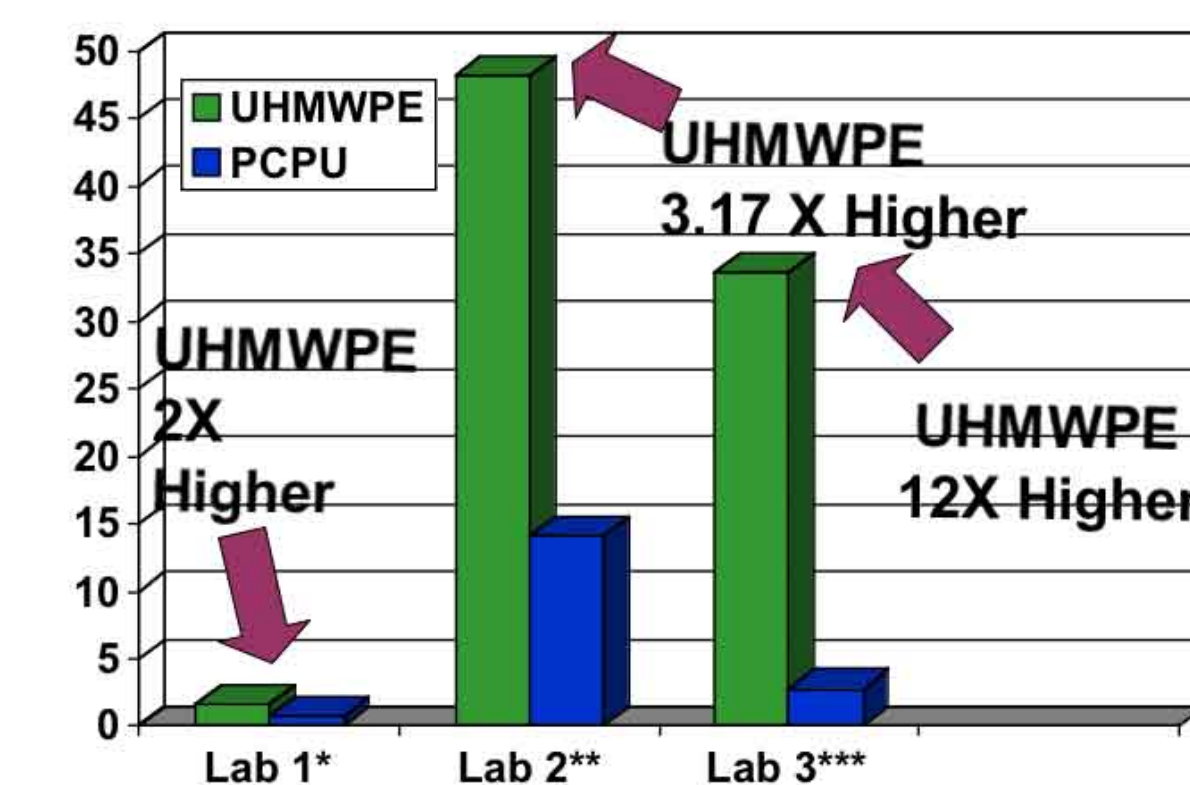
Studies have demonstrated the advantages of the full-fluid film layer of lubrication in-terms of enhanced wear performance.¹⁰

An acetabular "buffer" bearing was developed that features a pliable bearing surface formulated, biocompatible polycarbonate urethane (PCU). A review of design objectives and testing will be highlighted in this poster.

Results:

Wear studies have demonstrated performance up to twelve times better compared to polyethylene.

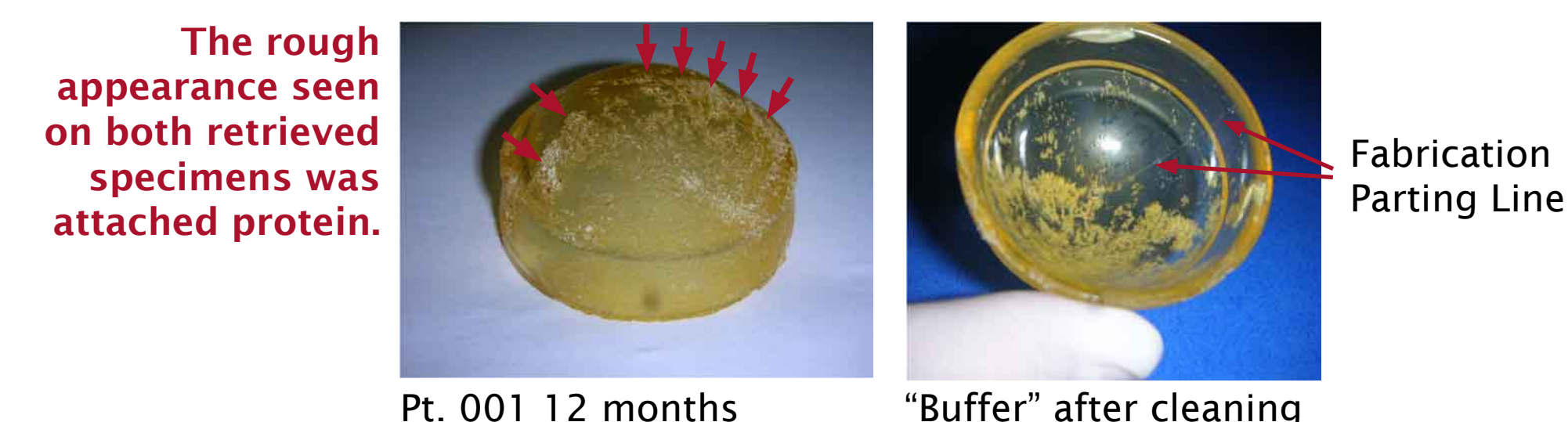
Forty-five components have been implanted reaching two years post-op. Two devices have been removed both for non-related implant issues. Retrieval analysis did not show any appreciable wear or damage to the bearing material.



Retrieved Specimen

Did not have any heavy metal elements - was some evidence of abrasion wear on back side (less than mechanical testing).

Note: No evidence of wear on bearing surface. Specimen weight loss measurement demonstrated equal to less mechanical wear testing. Final paper being prepared for publication.



Pt. 001 12 months

"Buffer" after cleaning

Conclusions:

To date we are encouraged by the early basic and clinical science, however, only additional research and time will demonstrate the long-term viability of this material.

- Less Wear
- Less Debris
- Hydrophilic
- Shock Absorbing
- Biocompatible
- Less Costly



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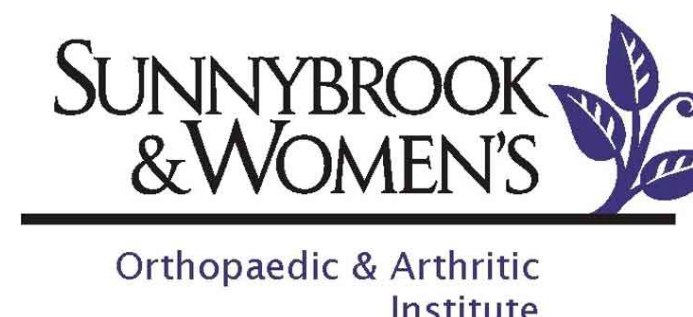
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