



Title

**SURFACE CHARACTERIZATION OF METAL-ON-METAL
HIP IMPLANTS TESTED IN A HIP SIMULATOR**

Authors

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Publication

Wear. 1999;225-229:708-715

Purpose/Premise

This article discusses a study conducted to gain an understanding of the wear characteristics of Co-Cr alloys.

Material and Methods

A scanning electron microscope and an atomic force microscope were used to examine the articulating surfaces of twelve 28mm femoral heads. Four were made from cast Co-Cr alloy, four from low-carbon wrought-forged Co-Cr alloy, and four from high-carbon wrought-forged Co-Cr alloy. One sample from each group was examined before hip simulator testing, and one sample from each group was examined after 3 million cycles of hip simulator testing. The remaining heads were examined after 6 million cycles of hip simulator testing.

Outcomes

Before testing, carbides in the cast and high-carbon wrought components were proud of the surface. After 3 million cycles, the cast implant lost 1.3mg of total mass, the high-carbon wrought implant lost 1.2mg of total mass, and the low-carbon wrought implant lost 8.0mg. After testing, carbides in the high-carbon wrought components were worn below the matrix surface. Some of the carbides in the cast components were also worn below the surface, while others remained proud. Some carbides in the cast components were pulled out, leaving micropits in the surface.

Conclusion/Recommendation

The authors concluded that all three alloys showed evidence of matrix wear and suggested that carbides standing proud of the surface wear faster than the surface matrix.

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