Title

WEAR AND DEBRIS GENERATION IN ARTIFICIAL HIP JOINTS

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Purpose/Premise
This article reports on a review of research studies that quantify the wear generated in hip joint simulators and retrieved prostheses for metal- and ceramic-on-polyethylene, metal-on-metal, and ceramic-on-ceramic bearings.

Material and Methods
Wear debris was analyzed from hip simulator tests of 28mm heads for each of the bearing couples, and compared with clinical retrievals of 22mm heads with a mean age of 13 years. Stainless steel, Co-Cr alloy, and zirconia heads were tested to 5 million cycles.

Outcomes
Polyethylene wear debris from the simulator tests was similar to the debris found in the tissues after retrievals. A statistically significant difference in wear rates was found with the different heads. In the metal-on-metal studies, the debris was smaller and more uniform than the polyethylene debris. Although the volumetric wear rate was less, the number of particles was greater. The high-carbon alloy showed a steady state wear rate of 0.03mm^3/million cycles while the low-carbon alloy was 0.33mm^3/million cycles. The steady state wear rate for the ceramic-on-ceramic components was similar to the metal-on-metal components.

Conclusion/Recommendation
The authors concluded that the size of the wear particles varies for different materials but that the wear reduction with metal-on-metal and ceramic-on-ceramic bearings may potentially extend the life of artificial hip joints.

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