



Title

RELATIONSHIP BETWEEN GRAVIMETRIC WEAR AND PARTICLE GENERATION IN HIP SIMULATORS: CONVENTIONAL COMPARED WITH CROSS-LINKED POLYETHYLENE

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Purpose/Premise

This paper reports on a hip simulator study that examines the rates of particle generation in conventional and crosslinked polyethylene, and then correlates them with gravimetric wear data.

Material and Methods

A hip simulator was used to test acetabular liners made from 1) standard EtO-sterilized polyethylene, 2) compression-molded, inert-gas, gamma-irradiated polyethylene, 3) highly crosslinked polyethylene subjected to 5Mrad of gamma irradiation, annealing, and EtO sterilization, and 4) highly crosslinked polyethylene subjected to 10Mrad of gamma irradiation, annealing, and EtO sterilization. All were tested with a 32mm cobalt-chromium femoral head.

Outcomes

There was no correlation between particle generation and gravimetric wear rates. The 10Mrad highly crosslinked group showed a 96% reduction in the volume of particles compared to the EtO-sterilized group.

Conclusion/Recommendation

The authors conclude that particle analysis provides a better method for quantifying polyethylene wear in articular surfaces that do not show detectable gravimetric wear, and that increasing the irradiation dose results in reduced gravimetric wear and affects the particle size distribution.

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