Title

REDUCED FRACTURE TOUGHNESS OF ENHANCED CROSS-LINKED POLYETHYLENE IS NOT ASSOCIATED WITH INCREASED WEAR DAMAGE

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Purpose/Premise
This article reports on testing that was performed to determine whether the lower fracture toughness of highly crosslinked polyethylene results in more pitting and delamination than found in conventional polyethylene.

Material and Methods
Polyethylene samples were divided into three groups. One group was electron-beam irradiated at 120kGy, while another group was irradiated at 65kGy. The third group was not irradiated. The irradiated groups were then melt annealed and gas plasma sterilized, while the third group was gamma sterilized. All samples were then subjected to accelerated aging. Wear testing using a cobalt chromium articulation surface was then performed to two million cycles.

Outcomes
Although the conventional samples had higher fracture toughness, half of them showed evidence of subsurface damage after 750,000 cycles, and delamination after two million cycles. None of the highly crosslinked samples showed any evidence of delamination after two million cycles.

Conclusion/Recommendation
The investigators concluded that the crosslinking process resulted in improved wear properties, and the decreased fracture toughness did not result in pitting or delamination.

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