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(Article begins on next page)

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Editorial Comment: Symposium: Advances in Polyethylene Biomaterials

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For decades, clinicians and researchers have debated bearing alternatives in the hip, ranging from the traditional metal-on-polyethylene (MoP) to erstwhile up-and-coming alternatives like ceramic-on-metal. The worldwide recall of a single, large-diameter metal-on-metal bearing design in 2010 [2, 3], started a sea change for the present decade in terms of what surgeons and patients were willing to accept in terms of the forgiveness of their hip implants. In the United States, at least, hip surgeons shifted their bearing preferences to polyethylene, articulating against, increasingly, ceramic heads [1]. For knee and shoulder surgeons, there was simply no contest: MoP is the dominant bearing. Polyethylene bearings, with their lower cost relative to ceramic bearings, it turns out, also fit conveniently into the current paradigm of value-based health care, both in the United States and abroad. Although surgeons and patients have already shifted their bearing preferences to polyethylene in hip, knee, and shoulder implants, research has not slowed on the topic of this biomaterial. We see some examples of the latest research presented in this Symposium on Advances in Poly-ethylene Biomaterials, which is based on selected papers from the 7th International UHMWPE Meeting. The goal of the meeting was to gather clinicians, researchers, and engineers from our HXLPE), with a special emphasis on the performance of thin acetabular liners and knee arthroplasty; HXLPE performance in upper extremity, ankle, and spine; international registry outcomes for HXLPE in hip and knee; novel ultra-high molecular weight polyethylene (UHMWPE) articulations with ceramic and PEEK bearing surfaces; advances in Vitamin E and new antioxidant technologies for UHMWPE; advances in thermal processing of HXLPE; structural composites and woven fiber applications of medical grade UHMWPE; as well as advances in biologic aspects of UHMWPE wear debris. The abstract proceedings for all of the presentations at this conference have been archived and can be accessed at www.uhmw-pe.org; papers of the broadest general interest are presented in this issue of *Clinical Orthopaedics and Related Research* 1. We currently reside in a clinical evidence-building phase for first-generation highly crosslinked and heat treated polyethylenes, as well as newer formulations incorporating antioxidants such as vitamin E. In addition to clinical and retrieval studies evaluating specific implant designs, and increasingly, comparing the effectiveness of different implant designs for targeted patient populations, we anticipate many clinical studies in the years ahead focusing on the clinical performance of polyethylene. But polyethylene research is not just about bearings. It is also clear from the most-recent UHMWPE meeting that poly-ethylene fibers, in the form of sutures and cables, are also areas for innovation, enabling new designs in fracture stabilization and scoliosis treatment. New implant bearing designs, HXLPE formulations, and new poly-ethylene cable-based implant

designs continue to be developed. Since we have already accepted and reaffirmed polyethylene as a bearing material of choice for total joint arthroplasty, we encourage the orthopaedic community to continue their engagement by continuing to build the clinical evidence about this growing family of biomaterials for hips, knees, and shoulders. Polyethylene research is far from over, but rigorous clinical studies are more important now than ever before.

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