During preclinical wear evaluation of joint replacement components bacterial contamination is a concern. However, there are no standardized procedures to retard microorganisms and little is known about the potential effects on friction and wear. Recently, the fraction of low-molecular weight proteins has been shown to decrease in the presence of bacteria and it is well established that the lubricant proteins play an important role in the wear of polyethylene components. In this case report we show that the presence of bacterial and fungal contamination can alter polyethylene friction and wear. Ultra-high molecular weight polyethylene pins were tested in a pin-on-flat tribometer using two bovine serum lubricants, A and B, identical, except that lubricant B contained a bactericide and fungicide (gentamicin and Fungizone®, resp.). Each test consisted of consecutive 250,000 cycle runs after which the pins were cleaned and weighed and fresh lubricant was used for the next run. Wear was determined gravimetrically and chemically via a tracer substance. The presence of the antimicrobial agents stabilized the friction coefficient around 0.06, which otherwise increased to values above 0.1 after an incubation period of 150,000 cycles. The bactericide also led to a significant reduction in the polyethylene wear rate, and wear factors obtained with lubricant B were six-fold lower than those in lubricant A. The results of this case study suggest the possibility that microbial contamination should be considered as a potential factor in evaluating the wear rate of polyethylene. Reproducible polyethylene wear testing may therefore entail proper bactericidal and fungicidal protocols. These results also suggest that the effects of joint infections on the wear of prosthetic bearing surfaces and concomitant clinical implications bear investigation.

Keywords: polyethylene, total joint wear testing, bovine serum lubricant, microbial contamination